Modern Metals

JUNE, 1961

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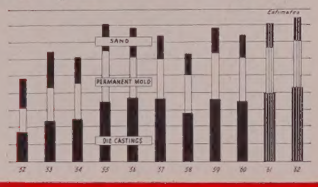
ALUMINUM CASTINGS SHIPMENTS

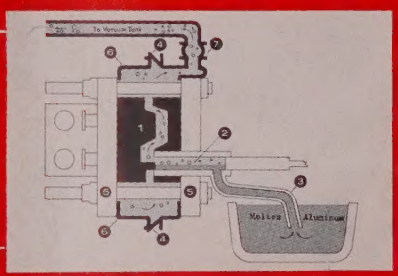
Survey shows die castings to spur 14% gain in 1961 (p. 30)

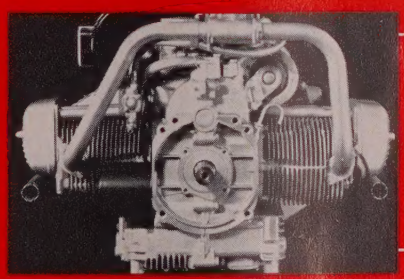


VACUUM DIE CASTING ALUMINUM

How To Make It Work Right (p. 60)

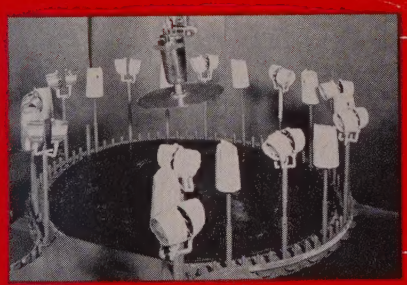
How One Company Uses It (p. 58)





DIE CASTINGS MAKE NEW ENGINES LIGHT, COOL RUNNING

(p. 36)



HOW A BIG CUSTOM FINISHER PAINTS DIE CASTINGS

(p. 68)

BIG ALUMINUM PERMANENT MOLD CASTINGS SIMPLIFY POWER MOWER DESIGN

(p. 50)

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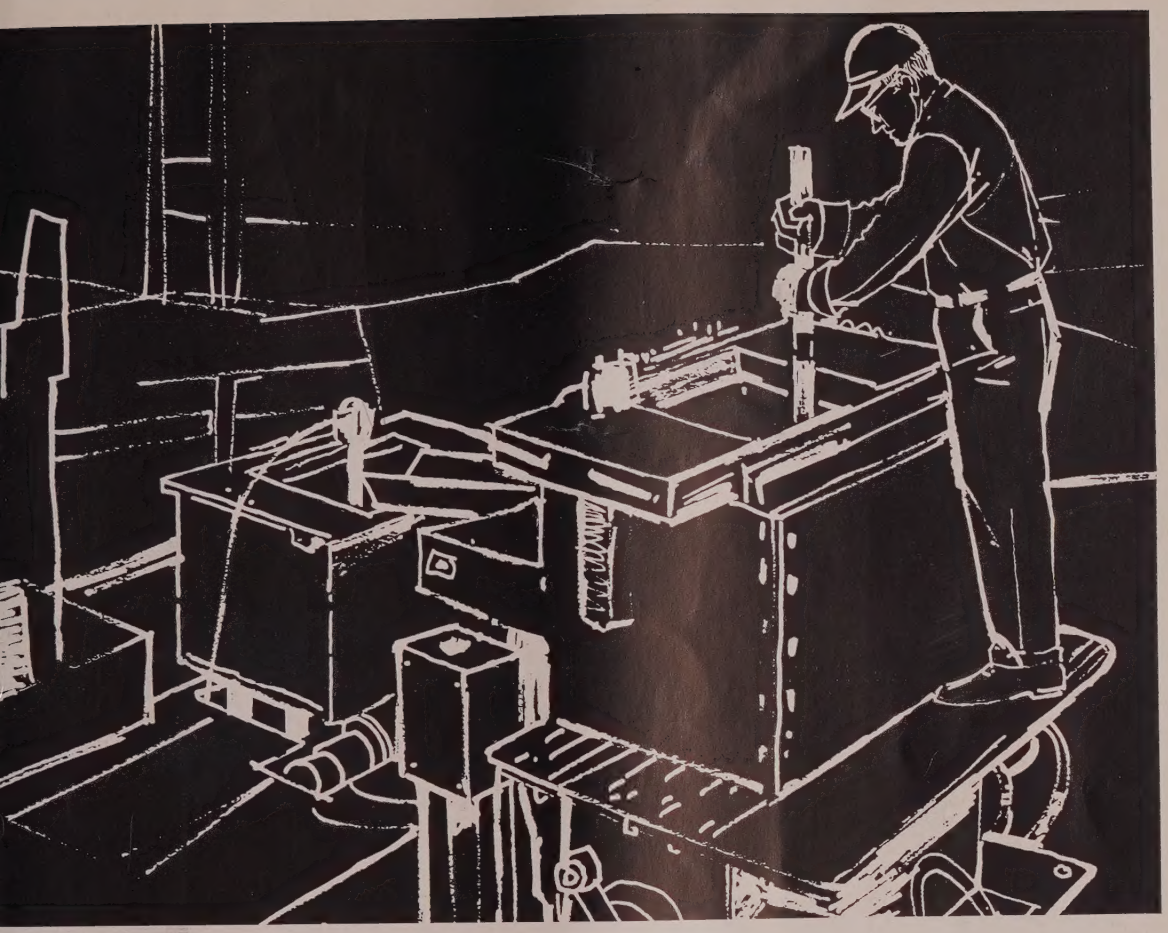

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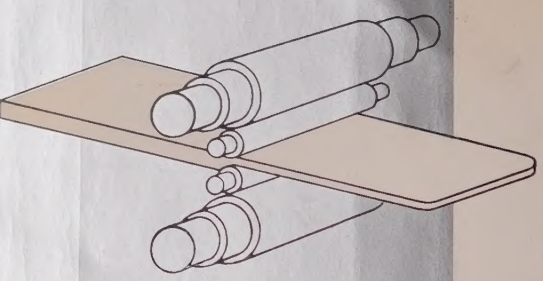

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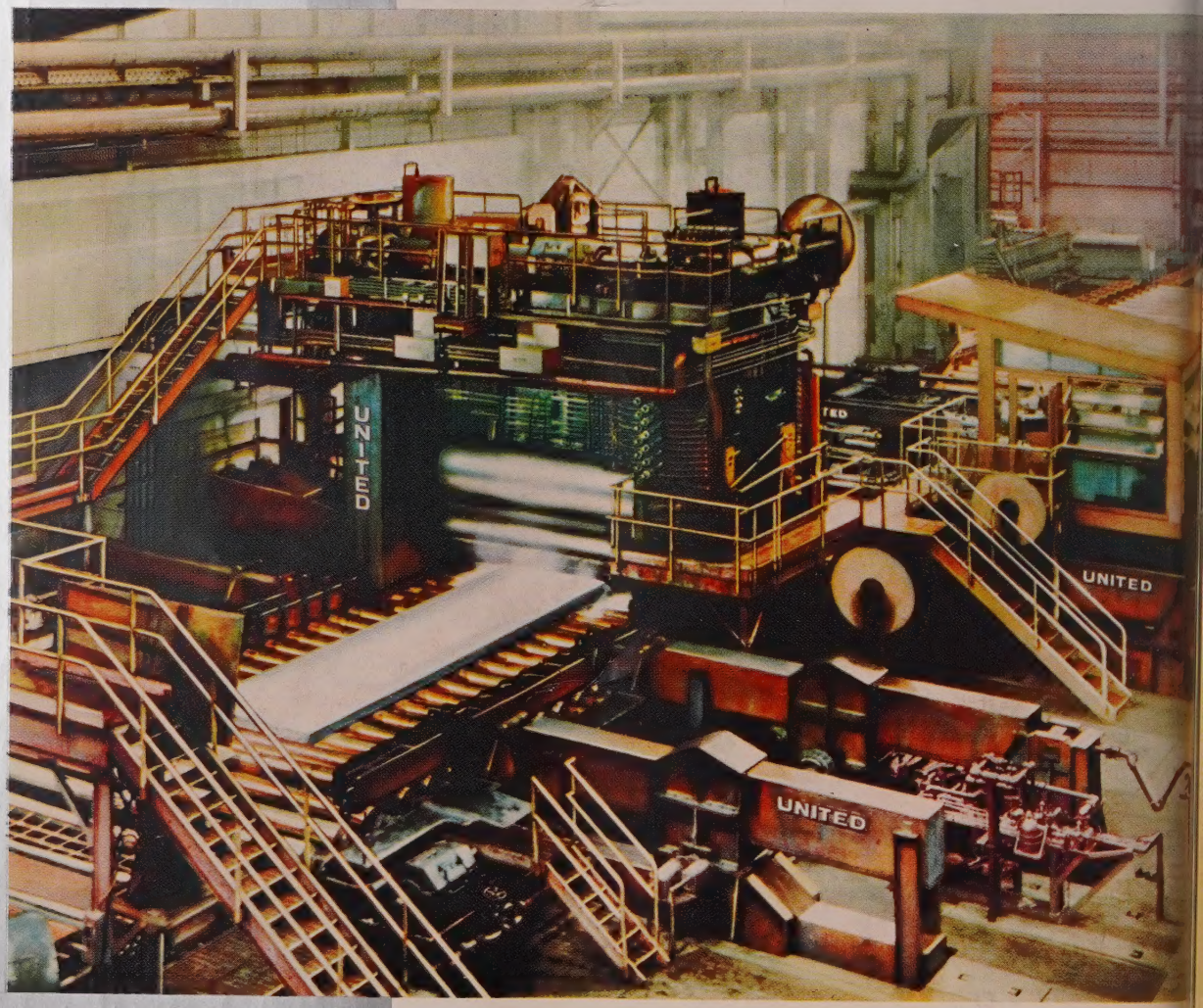

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Elongation	3%	12%

* Reynolds Metals Company and their Distributors are the only source for TENS 50 and A357 alloys. For complete information, write to *Reynolds Metals Company, P. O. Box 2346-FL, Richmond 18, Virginia.*

A357 alloy is covered under TENS 50 Patents granted to Navan Products, Inc., a division of North American Aviation, Inc. and licensed to Reynolds Metals Company.

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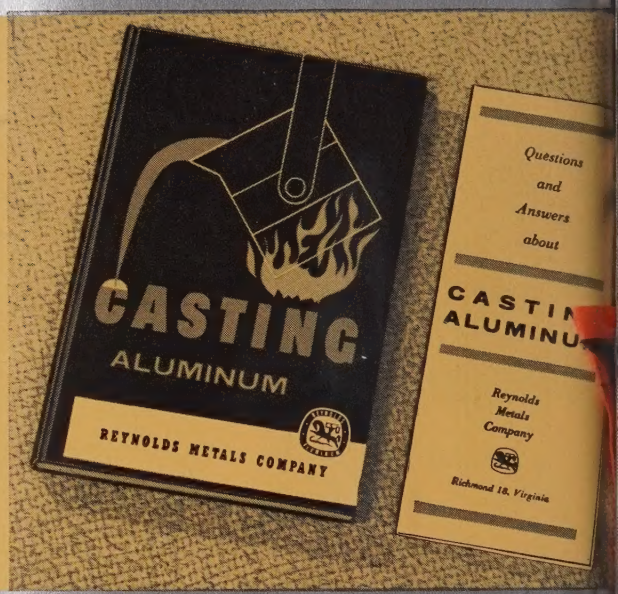
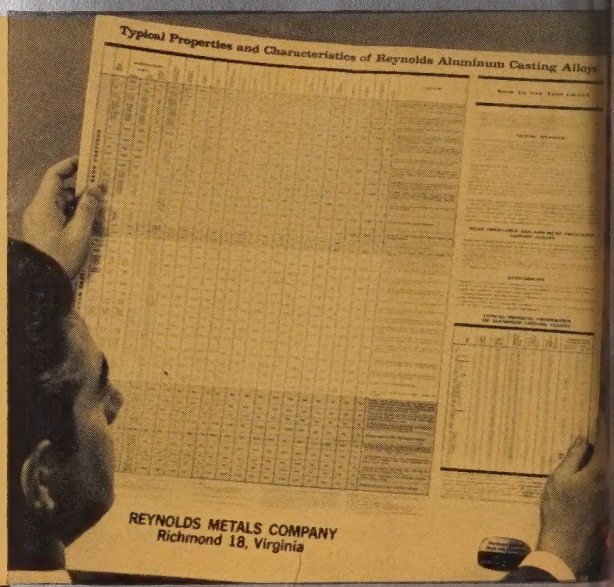


Aluminum Casting Alloys Selection Chart

This handy chart provides ready reference to the important properties and characteristics of various aluminum casting alloys. It tells you at a glance the characteristics, applications, and physical properties of alloys most suitable for sand casting, die casting, and permanent mold casting. A must for anyone who uses or makes aluminum castings.


Typical Properties and Characteristics of Reynolds Aluminum Casting Alloys
REYNOLDS METALS COMPANY
Richmond 18, Virginia

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- ☐ Aluminum Casting Alloys Selection Chart
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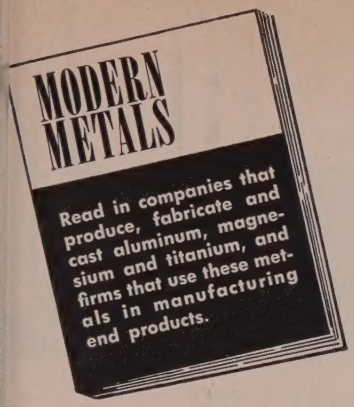
MODERN METALS
Read in companies that produce, fabricate and cast aluminum, magnesium and titanium, and firms that use these metals in manufacturing end products.

N THE COVER: All ten articles in this ue are devoted to the general subject of sting (see list at right). A few of them are tured on the cover. As for that tiny chart, u'll find it in enlarged form on page 30. ur forecasts for 1961 and '62 were based rtly on results of our survey of foundries d die casters. Maybe we are over-optistic, but there can be no doubt but what e aluminum casting game is on the reund.

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Modern Metals has by far the world's largest rculation among light metals fabricators, foundes and product manufacturers who use aluminm, magnesium, and titanium. Circulation: ow over 15,000 copies per month. Acceptance nder controlled circulation at Barrington, Ill.

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Modern Metals

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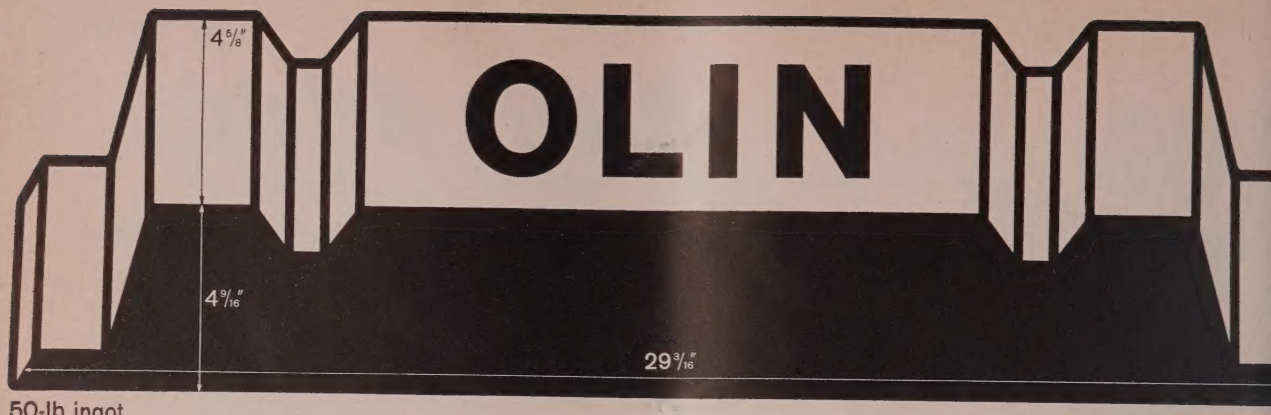
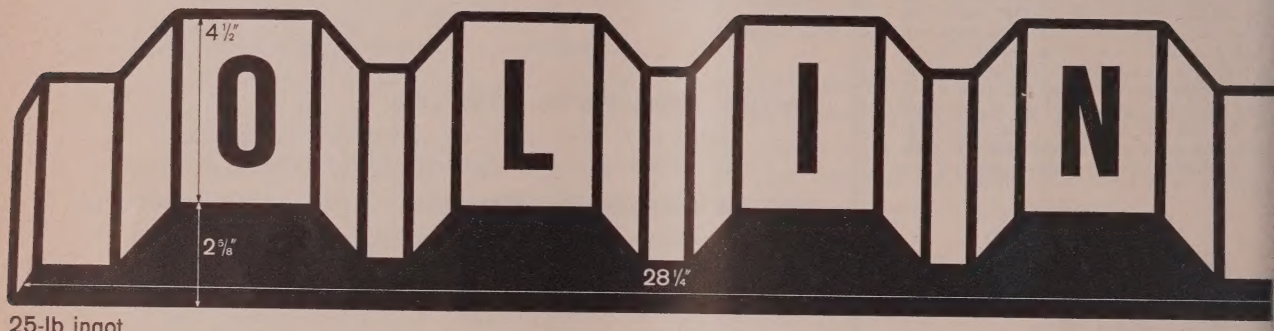
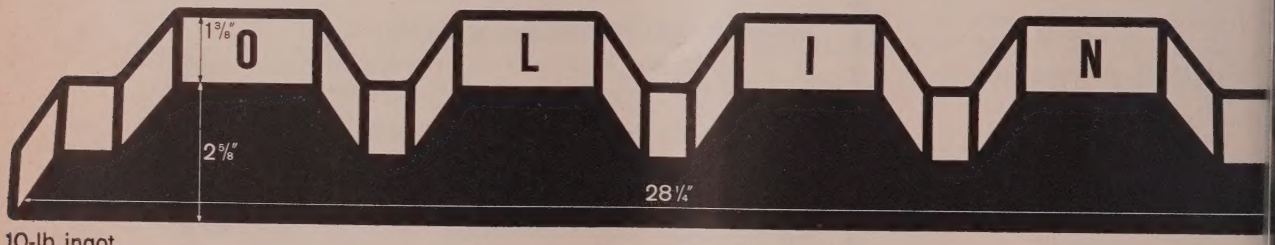


50-lb. ingot



25-lb. ingot



10-lb. ingot

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"E"—Wisconsin

MM—This firm makes farm machinery and highway maintenance equipment.

Anyone any ideas for Mr. "E"?

Wants to Acquire Aluminum Window Maker

Sirs:

We are on the lookout for a firm that manufactures a good quality line of aluminum windows, together with good management. . . . Our firm is already a substantial manufacturer of major building products and uses a lot of aluminum.

If you know of any such situation, please advise us.

"E"—Michigan

MM—If any window firm wants to consider being acquired or merged with a big brother, we'll forward correspondence to Mr. "E".

Plans to Install Anodizing Setup

Sirs:

We are interested in putting in our plant an anodizing setup and would appreciate it very much if you will send us a list of companies that do this work. . . .

"L"—New York

MM—We have sent along your request to manufacturers of anodizing equipment. They'll doubtless contact you awfully fast.

Starting an Aluminum Foundry

Sirs:

In the near future I am planning on opening an aluminum foundry. Would you be able to inform me as to where I can secure literature concerning sand casting, die casting, permanent molds, cleaning and finishing, and aluminum castings.

"J"—Ohio

MM—Your best initial source for literature and specifications helpful in starting a foundry is among suppliers such as aluminum smelters, primary producers, machinery manufacturers, and cleaning and finishing supply firms. We're sending you several reprints on the various subjects, and have advised some possible suppliers to do likewise.

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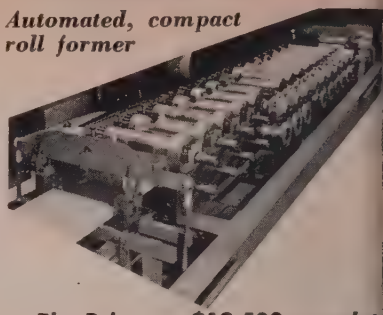

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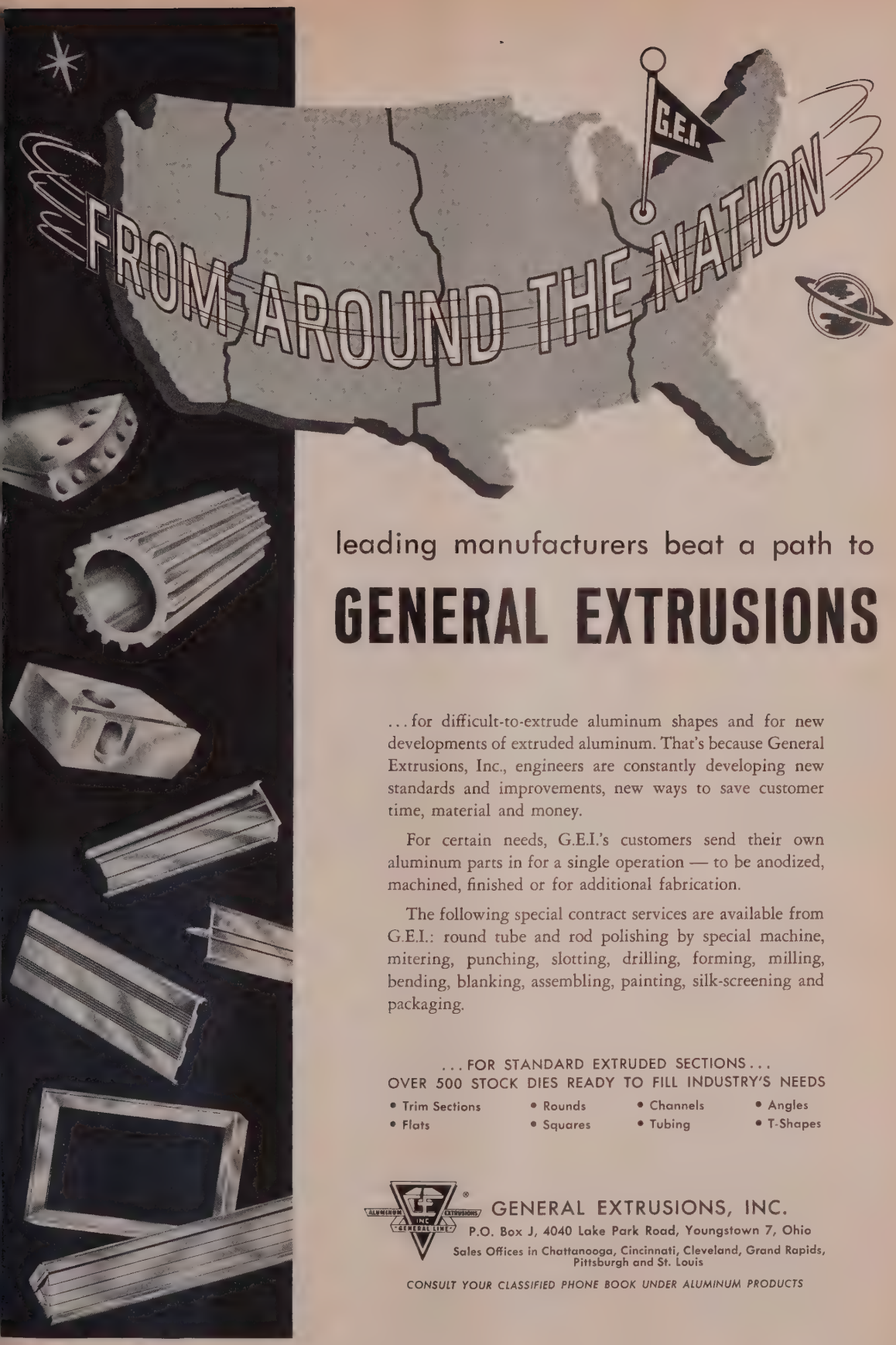

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Minnesota Mining. We do not package it in our plant, but buy and resell it in the original containers.

Our only claim is that we do sell Comastic in 5 oz. tubes and 5 gal. pails as a bonding agent for glazing aluminum storm sash.

While the writer of the letter is pleased with the product, and has apparently used it with success for other purposes, we cannot stand behind these claims without first having extensive tests. . . .

"R"—Ill.

MM—This letter is from American Screen Products Co., Chatsworth, Ill. Evidently, our original informant was over-enthusiastic.

Titanium Prices

Sirs:

I am interested in the comparatively new "wonder metal" titanium, and its alloys. I have been unable to find the going price for this metal, as quoted by its producers. What are the names and addresses of the principal producers?

I am writing to you because the librarian of Rice University, here in Houston, told me that you probably know more about all phases of most modern metals than anybody else.

"H"—Texas

MM—The price of titanium has constantly been reduced over the past decade, to the point where fabricators say it's as cheap as stainless steel for certain things. Both production and demand have been increasing during the past year, and new uses are regularly being developed for this tough, non-corrosive metal.

However, since you didn't mention the form in which you are interested, we can't be helpful. Furthermore, titanium people are not overly communicative when it comes to prices (at least to us), so we suggest you write to Titanium Metals Corp. of America, 111 Broadway, New York, N.Y.

Good luck, and we hope you can use lots of the stuff.

Look It Up In Our Buyers Directory

Sirs:

We would appreciate your forwarding a copy of the Light Metals Buyers Guide.

We are particularly interested in names of companies making:

1. Small spun aluminum parts (approx. 6"-8" dia). We are looking for a company that can produce relatively high volume (approx. 500,000 pieces annually).
2. One and two quart aluminum cans.

"W"—Michigan

MM—Copies of our Light Metals Buyers Directory have been sent to both of these readers. We still have plenty of copies of this Directory—a convenient reference tool for anyone who needs most any type of metalworking material, equipment or service.

Source Seeker

Sirs:

Please furnish all names of manufacturers of ingot, sheet and extruded aluminum.

Thank you for your cooperation.

"A"—New York

MM—Most every worthwhile source is listed in our Light Metals Buyers Directory which starts on page 93 in this issue.

This directory has been reprinted and free copies are available to all who want them.

Aluminum
Brass
Copper
All Sizes
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Quality products of the finest mills in England and the Continent, competitively priced
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is the only firm in America wit complete painting facilities;
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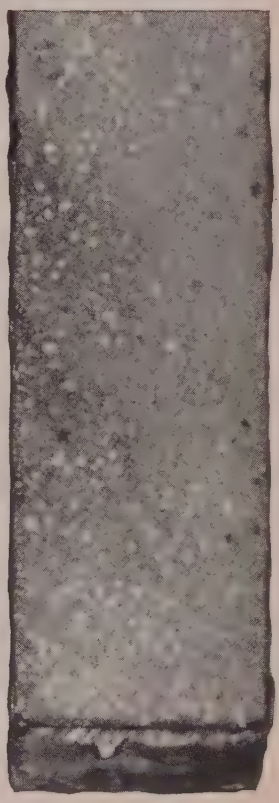
NEW KAISER LO-SIL* REFRACTORIES VIRTUALLY STOP ALUMINUM PENETRATION

These are unretouched photographs of cross sections of brick after a molten aluminum immersion test at Kaiser Aluminum's Department of Metallurgical Research, Trentwood, Washington. Dark areas show aluminum penetration.

BRAND A
90% ALUMINA BRICK
7 DAYS
in 7075 alloy at 1400° F.

BRAND B
90% ALUMINA BRICK
15 DAYS
in 7075 alloy at 1400° F.

BRAND C SPECIAL
HIGH ALUMINA BRICK
30 DAYS
in 7075 alloy at 1400° F.



NEW LO-SIL SUPER
30 DAYS
in 7075 alloy at 1400° F.

Kaiser Refractories' new Lo-Sil Regular and Lo-Sil Super refractory brick — designed especially for aluminum melting furnaces — achieve a major victory in saving metal, increasing purity, and extending refractory life.

Repeated tests prove Lo-Sil Super resists aluminum attack 30 times better than other low-silica, high alumina brick . . . and virtually eliminates loss of metal by absorption!

Controlled comparisons show Lo-Sil Super reduces silicon pickup to about one-twentieth that of standard 90% alumina brick. Refractory inclusions are nil. Dross removal is easy. Through increased resistance to thermal shock, impact and abrasion, Lo-Sil Super brick extends lining life and greatly reduces down-time.

Ask your Kaiser Refractories Sales Engineer about new Kaiser Lo-Sil Regular and Lo-Sil Super Brick—plus Lo-Sil Mortar.

Mail coupon at right for free copy of "Kaiser Lo-Sil Refractories," or contact Kaiser Refractories & Chemicals Division, Kaiser Aluminum & Chemical Sales, Inc. (Canadian Subsidiary: Refractories Engineering & Supplies, Ltd.)

PITTSBURGH 22, PA. . . . . 3 Gateway Center
MEXICO, MISSOURI . . . . . Mex-R-Co Building
OAKLAND 12, CALIF. . . . . 300 Lakeside Drive

*TRADEMARK KAISER ALUMINUM & CHEMICAL CORPORATION

KAISER REFRACTORIES

High Alumina, Fireclay, Graphite and Silica Refractories
Periclase Brick, Mortars, Grains, and Ramming Mixes

Kaiser Refractories & Chemicals Division
Kaiser Aluminum & Chemical Sales, Inc.
300 Lakeside Drive, Oakland 12, California

Send me the new technical booklet "Kaiser Lo-Sil Refractories."

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Address_____

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HEAVY SHOCK AND HIGH STATIC LOADS

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PRECEDENT 71
ALUMINUM CASTING ALLOYS

HIGH YIELD STRENGTH • HIGH SHOCK RESISTANCE

Precedent 71 A and B are high strength, shock resistant aluminum sand casting alloys which in the condition as cast and aged at room temperature, develop the highest combination of physical and mechanical properties of any such alloy now available. Precedent 71A as cast and fully aged has a yield strength of 36,000 p.s.i. As solution heat treated and aged in the T6 condition, it has a yield strength of over 40,000 p.s.i. and still has over 5% elongation. Precedent 71B as cast and fully aged has a yield strength of 32,000 p.s.i. and at the same time has 7% elongation. Precedent 71 A and B offer a combination of high yield strength and high shock resistance not found in other aluminum casting alloys.

Write Today for Free Bulletin

WILLIAM F. JOBBINS INCORPORATED

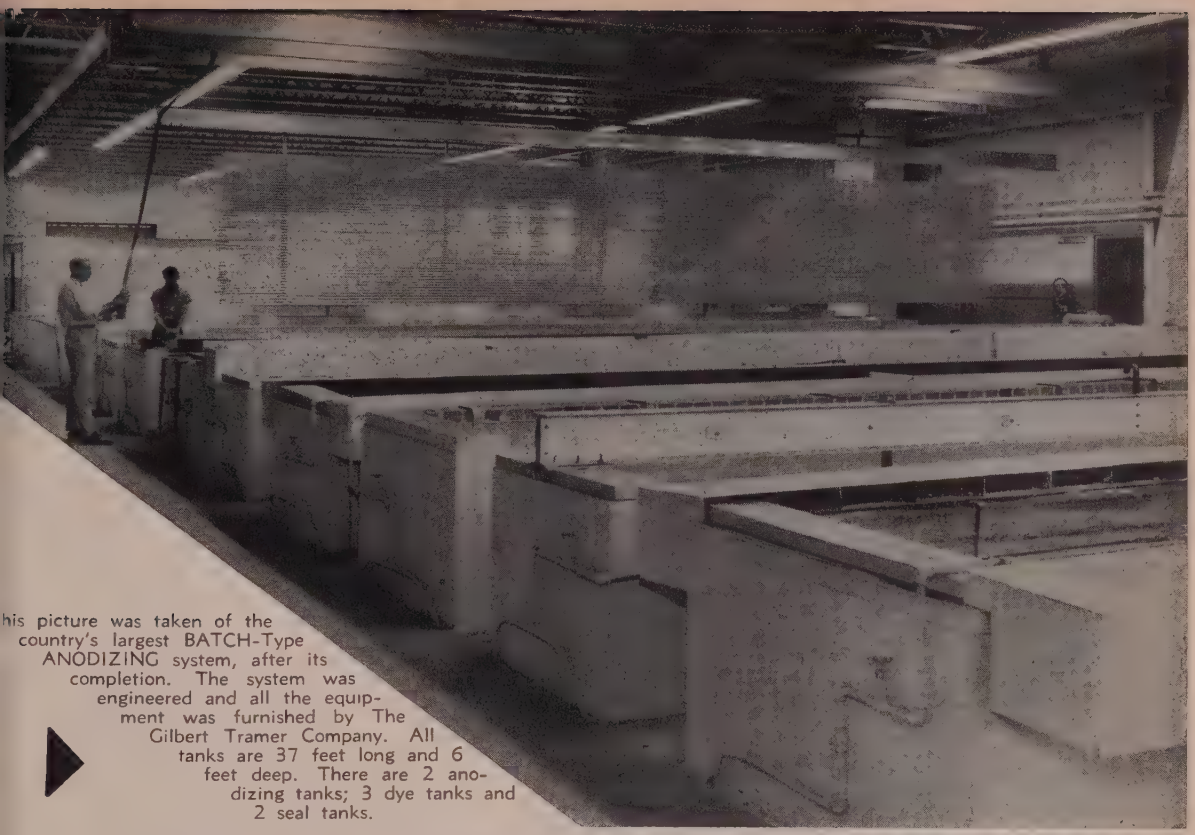
P. O. BOX 230C
AURORA, ILLINOIS

Here and There

Long-Lasting Licenses « « The rusted steel l cense plate is heading for oblivion as more and mor states switch to aluminum for their auto tags. Th latest to see the cost-cutting light is Tennessee, wher an estimated 1.5 million vehicles will boast aluminur plates in 1962. Tennessee Prison Industries will chev up some 300 tons of Alcoa prepainted aluminur sheet in fabricating and printing the tags. But ther prison authorities may have to find some other tas for the inmates; the aluminum plates can be use for up to five years by issuing successive year marker that are glued or clipped to the original plates. Th economies are appreciable; Tennessee authorities ex pect to save $100,000 annually. According to Alcoa more than 16 million vehicles will carry aluminur plates by the end of '62. That probably adds up t some 3000 tons of aluminum — a good sized marke for sheet.

Another Tough Plastic « « Celcon, a new high strength plastic, is the latest in the growing list o synthetic materials that are challenging aluminum an other metals in major markets. Celcon is classifie chemically as an acetal co-polymer, and Celanese Corp of America says it has all the qualities required of high strength engineering plastic—hardness, stiffnes dimensional stability, light weight and resistance t abrasion and environmental attack. In addition, sai W. P. Orr, president of Celanese Polymer Co., Celco has displayed highly favorable qualities for economica injection molding for simple or intricate products. I also can be extruded and blow molded into containe and other plastic products. "Tests have proved tha Celcon can carry heavy loads over long periods o time at high temperatures, and resists attack by a wid range of chemicals, including alkalis," Orr declare "This unique combination of properties gives Celco long-term predictable performance under extreme adverse conditions and opens the door to new us for plastics." The largest immediate applications a expected to be in replacement of die cast zinc, al minum and brass, to say nothing of copper and stee Celanese Corp. estimates that the total market f high performance plastics will triple during the ne three years and reach a level of 200 million poun per year by 1970.

Mag Makes Comeback « « Magnesium s h i ments last year totaled 54,350 tons, the best showin the metal has made in the U. S. since 1956. On worldwide basis, production increased 27% in 19 and, according to the U.S. Bureau of Mines, U exports were double those of 1959. "Although domes consumption of primary magnesium was 6219 to below 1959, shipments rose 6818 tons," the Bure reported. "New and increased uses of the metal we noted during the latter half of 1960, particularly f die castings in automotive equipment." This is go news for magnesium. One of these days, some U.S. au maker may get around to producing a magnesiu



his picture was taken of the country's largest BATCH-Type ANODIZING system, after its completion. The system was engineered and all the equipment was furnished by The Gilbert Tramer Company. All tanks are 37 feet long and 6 feet deep. There are 2 anodizing tanks; 3 dye tanks and 2 seal tanks.

Installation was made at the Weather-Tite Company in Bedford, Ohio.

TRAMER

FURNISHES COMPLETE EQUIPMENT FOR:

For more than 20 years, The Gilbert Tramer Company has designed, built and installed equipment for the aluminum finishing industry. Complete layout and installation drawings are furnished. A trained resident engineer for "start-up" service is available, after the installation is made.

ANODIZING
BRIGHT DIPPING
HARD COATING
ETCHING
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CHEMICAL TREATMENTS OF ALUMINUM

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"OLIVER" No. 296-D HYDRAULIC CUT-OFF SAW

Cuts non-ferrous metals and materials. Ideal production cut-off saw with high accuracy. Holds tolerances of plus or minus .001" in cutting magnesium extrusions 2" long. Features elaborate guarding around saw blade and assures deflection of chips below table. Heavy cast iron base casting gives greater capacity. Write for information.

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- AZ31B MAGNESIUM ALLOY
- HM21A MAGNESIUM-THORIUM ALLOY
- MAGNESIUM TOOLING PLATE
- BORAL PLATE

On the west coast, contact warehouse distributor: Continental Metals, Inc., 7001 Santa Monica Blvd., Los Angeles 38, Calif. Tel. Hollywood 9-8383.

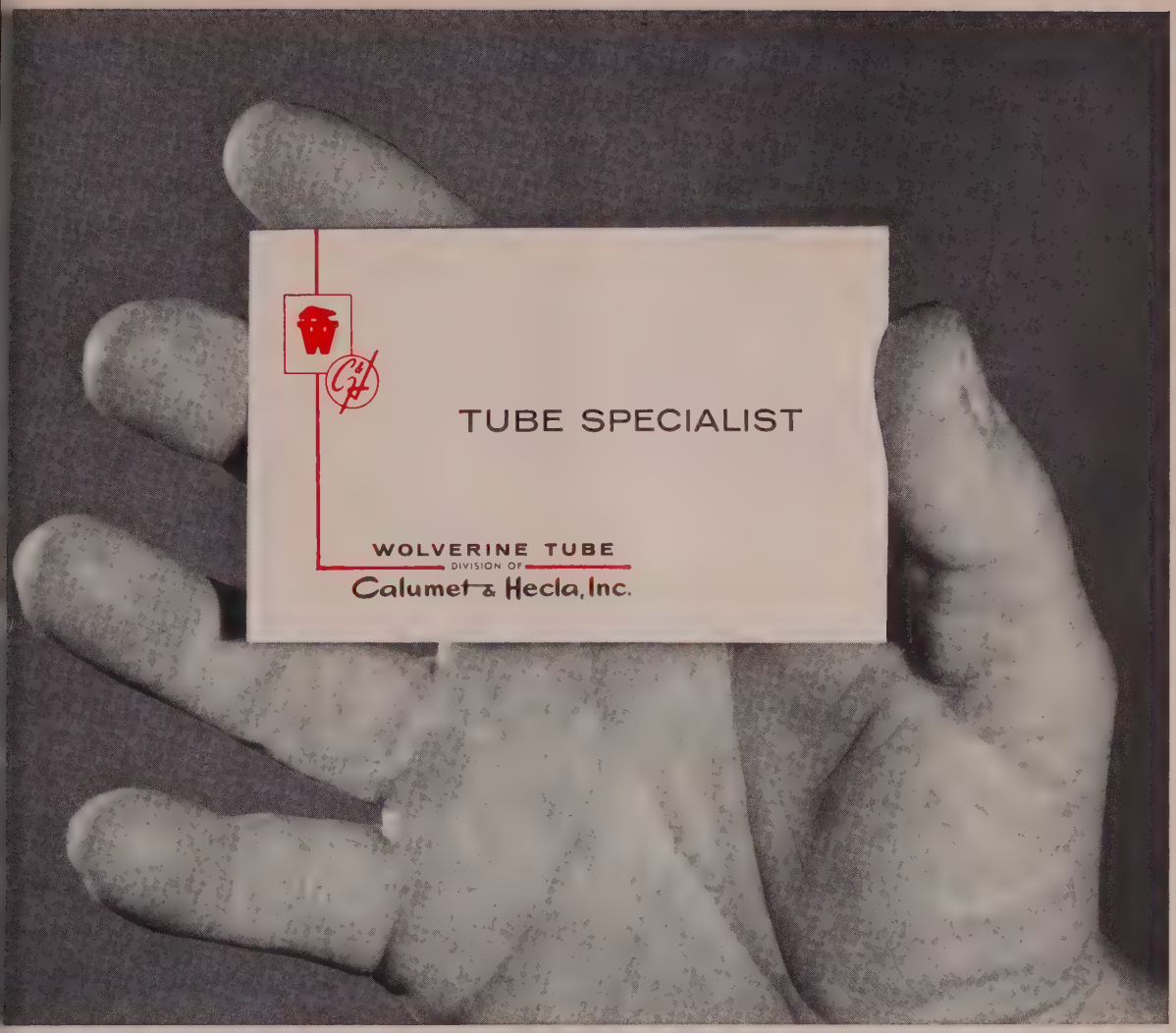
BROOKS & PERKINS, INC.
1954 W. Fort St. • Detroit 16, Michigan
Tel. TA. 5-5900
Offices in Washington and New York 61-T-3

engine block. Volkswagen did, and that new 40-h VW engine is said to be a honey of a power packag

Think Small?? « « While on this subject, we wer interested to note that about a million of the beetl shaped buggies will roll out of Volkswagen's assembl plant in Wolfsburg, West Germany this year. Whe we recall that less than 20,000 VW's were produce in 1948, we wonder about the headline — "Thin Small" — on that famous ad that had a tiny pictur of a Volkswagen centered in a full page in LIF magazine. The mighty midget hasn't changed muc in appearance over the years, but important enginee ing improvements have been made. One of the mo interesting from the light metals standpoint was th year's switch from permanent mold casting to di casting for the magnesium crankcase. The two cran case halves are now produced on 1000-ton die castin machines at the foundry in Wolfsburg, making th by far the biggest magnesium die casting operatio in the world. In fact, VW is the No. 1 magnesiur consumer; the foundry casts some 1800 tons of the meta per month, plus about 1300 tons of aluminum.

Thin Tin's Slim Saving « « American Can Co. greatly cheered by introduction of new lightweigh tinplate which is now being tested by the nation leading brewers. Canco showed samples of the new lighter and less expensive cans made from thin plat at the recent Packaging Exposition in Chicago. Robe C. Stolk, Canco's sales vice president, said that cu tomer's savings with the new container will be abou 80 cents per thousand cans. "This means a 2-cen per case saving," he explained. "Projected against th 9 billion cans used by the brewing industry in 196 this would mean total savings of roughly $7 millio for the beer industry." Pilot use of the new can shov that the brewer need make but minor adjustmen in his operations, according to Stolk. Use of the ne container means a weight saving of about a hal pound per case compared with the conventional be can, "resulting in a substantial savings in freight cos for brewers." Seven million bucks sounds like a l of money, but it's probably a drop in the bucket to th entire U.S. brewing industry. And a half-pound savin per case of beer is hardly worth talking about.

Brighter Titanium Outlook « « Optimists wh never lost faith in titanium have a right to feel vi dicated. The Commerce Department thinks a 10 boost in demand is in the offing for the erstwhi "wonder metal." There has been a steady call f titanium for bomber engines and missiles, and shi ments have shown a consistent increase over each the last 18 months. Titanium Metals Corp. of Americ the outfit that stuck to its guns through a long d pressed titanium market, was able to pay more tha a half-million dollars in dividends to its two owne Allegheny Ludlum Steel Co. and National Lead C But the fickle military market is nothing to rely o The sooner the titanium industry can register sor respectacle gains in the chemical, petroleum, ar food equipment fields, the better its prospects will be.



Ask Your Wolverine Tube Salesman... He Knows...how to give you IOA!

When you deal with a Wolverine Tube salesman you'll be aware of service over and above that which you normally receive.

That different "something" is IOA—INDIVIDUAL ORDER ATTENTION—a subject that is close to the heart of all Wolverine personnel.

For example, because Wolverine specializes in the manufacture of seamless drawn and extruded aluminum tube, your Wolverine salesman knows this product thoroughly—has the experience and product knowledge needed to help you obtain maximum value for your tubing dollar. He can also show you how other Wolverine services such as production line packaging, Field Engineering Service and extensive plant facilities can be of advantage to you.

Next time you order seamless drawn or extruded aluminum tube—specify Wolverine—have the Wolverine salesman show you how IOA works for you.

WOLVERINE TUBE
DIVISION OF
Calumet & Hecla, Inc.
DEPT. N, 17262 SOUTHFIELD RD., ALLEN PARK, MICH.
TUBEMANSHIP in Copper—Copper Alloys—Aluminum—Special Metals

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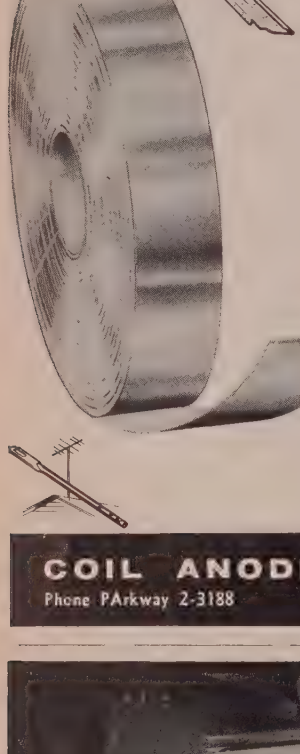

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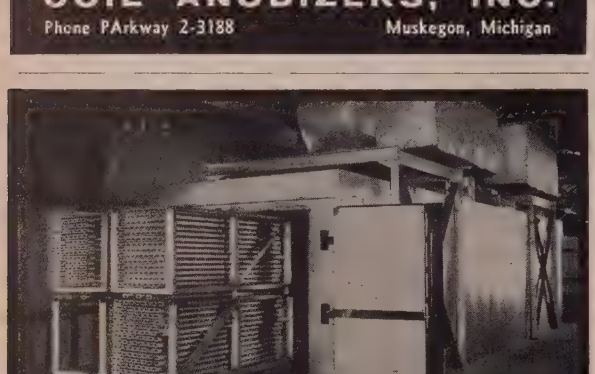

carl mayer Designs and Builds Better ALUMINUM Extrusion AGEING OVENS

This truck type oven is now in service at Penn Extrusion Corporation, Erie, Pa. Close temperature control is maintained through the use of two gas fired, recirculating air heating systems. Other Carl Mayer design features assure trouble-free, economical operation. Write for Bulletin HT-53.

THE **carl mayer** CORP.
20800 CENTER RIDGE ROAD, CLEVELAND 16, OHIO
OTHER PRODUCTS: Core & Mold Ovens • Rod Bakers • Paint and Ceramic Drying Ovens • Special Processing Equipment & Accessories

New Enterprise

A compact **home gymnasium,** called the Arch-Gravity Table is designed to afford varied exercise for physical fitness buffs. Made by Ryan Research & Development Corp., P. O. Box 821, Cleveland 22, the contrivance is adjustable to more than 500 exercise positions. It's made of anodized aluminum tubing, in gold or silver satin finish.

Zero Weather Stripping Co., Inc., 453 E. 136th St., New York 54, makes Astragal, an adjustable **weather strip** material having a wool pile insert and extruded aluminum or bronze holder. Adjustability compensates for door expansion and contraction.

An improved **heating element** in the new Chromalox trim line electric baseboard heaters consists of two tubular elements attached to an aluminum plate. Greater area of the element produces a "stack effect" resulting in better air circulation and lower operating temperatures. The units are made by Edwin L. Wiegand Co., 7500 Thomas Blvd., Pittsburgh 8, Pa.

Specialized **ash trays** that could serve as personalized gifts for customers or prizes in group competitions are made of gold anodized aluminum by American Emblem Co., 4 Genesee St., Utica 1, N. Y.

New facilities for refining **super purity** aluminum have been installed at Kaiser Aluminum & Chemical Corp.'s Mead, Wash., reduction plant, increasing capacity by 55% to 5,300,000 pounds annually.

Another aircraft firm is trying to get into the building products business—and why not? This time it's Northrop Corp. of Los Angeles, which has purchased Arcadia Metal Products, Fullerton, Calif., makers of **sliding doors, prefabricated walls** and **sun control systems.** Arcadia, with sales of $4.7 million and profits of $49,000 last year, received 20,000 shares of Northrop stock (worth $1.2 million).

The government's aluminum and magnesium **sand and die casting facilities** at Teterboro, N. J., have been purchased by Bendix Foundries, who had been renting the plant and equipment from the navy. Bendix now has 175,168 square feet of space devoted to casting nonferrous metals.

A new extruded **hinge,** for heavy or light duty, is made in lengths up to 12 feet by TA Mfg. Corp., 460 Alger St., Los Angeles 39, Calif. Hinge comes in standard continuous design or with nodes of one hinge half slotted to permit the assembly to swing open and detach. All hinges have 1-inch nodes and open to a 2 inch width.

The **curtain wall** contract for Houston's (Texas) $2-806,000 World Trade Center has been awarded to Reynolds Metals Co., Richmond, Va. The aluminum units will clad the exterior of the top seven floors of the 11-story structure. They will have black spandre

lighten the load

n men and machines with Alcoa Aluminum Wrought Tooling Plate

ool or jig made of Alcoa® Alumi- n Wrought Tooling Plate weighs y one-third as much as it would in el. One man—or a woman—can ndle change-overs where you'd nor- lly use a crane or call several men their jobs. Aluminum jigs are easier set up, open, close and store.

Alcoa's wrought plate spares the rses, too. It machines three times ter than steel (and with greater ac- racy). You can cut labor costs as ch as 60 per cent. Less power is en up. Tools last longer.

Alcoa offers two basic grades of ought aluminum tooling plate, avail- e from conveniently located distribu- s throughout the country.

ALCOA TYPE 100: A nonheat-treated wrought product for economy where maximum mechanical properties are not required. Offers maximum stability with severely machined end products.

ALCOA TYPE 200: A wrought heat-treated plate. Stretcher stress relieved for minimum distortion during machining where close dimensional tolerances are not vital but moderately high mechanical properties are called for.

Alcoa also produces a cast, machined plate for use where no distortion in any plane can be tolerated. All three grades are thoroughly described in a new brochure. To get your free copy, call your nearest Alcoa sales office or distributor, or write to Aluminum Company of America, 860-T Alcoa Building, Pittsburgh 19, Pa.

Call The Aluminum Man, your local Alcoa Distributor Salesman

ALCOA ALUMINUM

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sheet • extrusions • castings

UP TO

29 FEET, 6 INCHES LONG

Maximum width	3-ft., 8-in.
Maximum depth	5-ft., 4-in.

Alcoa Licensed 204-R1; 215-R1; 2010; 2020; 2030 & 2140 Gray; and 4005 Gold

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Not at all. Many small firms are getting new business with ads of *this* size. It will cost you only $120 per month (on annual basis) and we will make up a *selling* ad for you. For full details, write to Rocky Brown at Modern Metals, 435 N. Michigan Ave., Chicago 11.

panels and natural anodized aluminum mullions. Th Center is now under construction; will be occupie early next year.

An aluminum **door and window** manufacturing facil ty in Olmsted, Ill., has been opened by Progressiv Aluminum Corp., division of Perm-A-Trim Corp. Detroit. The 13,000-square-foot plant is equipped wit automated window and door fabrication lines and ma chines for making custom door and window products.

A licensing agreement in the United States for th manufacture and distribution of **electrical conducto accessories** designed by Aluminium Limited has bee made between A. B. Chance Co., Centralia, Mo., an Aluminium Limited Sales, Inc. Under the agreemen Aluminium Limited will supply designs and manufa turing techniques to Chance.

A fleet of 189 aluminum-bodied **delivery trucks** wa placed in service in Pittsburgh recently by Ward Bakin Co., who distributes baked goods to homes. Some 100 pounds of aluminum sheet and extrusions are used i each truck fabricated by Aerobilt Bodies Inc., Athen N. Y., subsidiary of Grumman Aircraft. Units have 10-foot 10-inch cargo space but carry the same 1-to payload the 12-foot steel trucks being replaced carrie

The third expansion program in four years has bee completed by Aluminum Finishing Corp., 14565 N. W 26th Ave., Opa-Locka, Fla. Warehouse space and truc bays have been added, power facilities upped and **bright dip color line** installed. The line consists of 3 tanks capable of coloring products up to 16 feet lon Parts up to 31 feet long can be gold anodized.

Boat production is being increased by Richardso Boat Co., North Tonawanda, N. Y., firm now controlle by Avro Aircraft Ltd., Toronto, Canada. Three hull made with planked-aluminum, are expected to b completed every four days.

Aluminum tubing is said to offer design and layou flexibility to the flour milling industry in constructio of **spouting systems.** More than 6000 feet of tubing ha been woven into such a system by Kice Metal Produc Co., 485 S. Washington, Wichita, Kan., and is bein used in a pilot operation at Kansas State University. pitch of 45 degrees must be maintained on wood or ste spouting, but only 35 degrees for aluminum.

Insulated wire and cable for the electrical conducto market is being produced at Reynolds Metals Co.'s ne Chester, Pa., plant. Manager of the new facility Charles R. Wentz.

The joint acquisition of Safety Electrical Equipmen Corp., New Haven, Conn., manufacturer of **mote generators,** has been announced by Ajax Magnetherm Corp., Youngstown, Ohio. Ajax has purchased 50% the stock, the other half being purchased by a grou headed by Robert Dodds, present executive vice pres dent and general manager, and John Kennedy, presen vice president. Current management of Safety will co tinue to operate the firm.

A plant that will turn out 500 **mobile homes** a year being established at Kingman Air Field, Kingma Ariz., by Vagabond Coach Mfg. Co., New Hudso Mich.

LET

Superior

DEVELOP YOUR ALUMINUM "TRIM IDEAS"

Here's how one company used Superior Industries' engineering services and production facilities in planning its metal trim requirements for a new product.

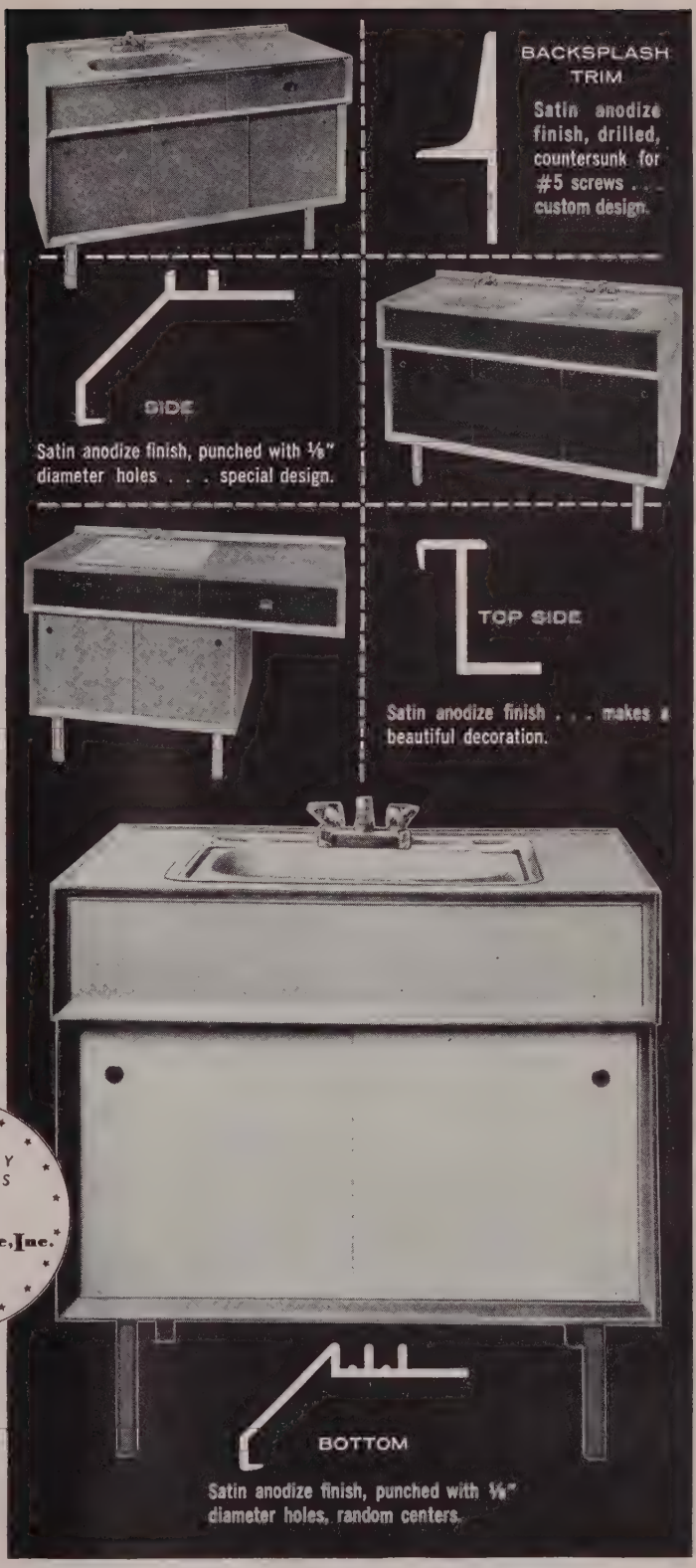
. . and it wound up with beautiful, special designs to match functional and decorative requirements of an exquisite AllianceWare lavatory vanity.

Peter Muller-Munk Associates designed the AllianceWare vanity and also the aluminum trim. Superior was called upon to meet the specifications and match uncompromising mechanical accuracy and finish.

Under one roof, Superior miters, bends, rivets, drills, countersinks and notches the metal. Chemical and hand polishing, spray painting, and anodizing get professional attention.

Thousands of companies have used Superior's facilities. So give it a try . . . send samples, blueprints or ask us to call.

LAVATORY VANITIES BY AllianceWare, Inc.


BACKSPLASH TRIM
Satin anodize finish, drilled, countersunk for #5 screws . . . custom design.
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Satin anodize finish, punched with ⅛" diameter holes . . . special design.
TOP SIDE
Satin anodize finish . . . makes a beautiful decoration.
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Satin anodize finish, punched with ⅛" diameter holes, random centers.

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Creative Ideas PAY OFF!

Electric and open hearth steel castings from 1 lb. to 100 tons

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Useful Data

Aluminum Furnace Refractories," an article in which are described ractory products of Harbison Walker Refractories Co., has been re- nted. In it are discussed research methods in the development of the oducts, efficient test procedures, and reports of actual test results. Specific es of refractories which are recommended for each furnace section are umerated. Also included are bonding mortars, monolithic materials ch as plastics and castables, and ramming mixes. For your copy write to bert R. Miller at the company, Pittsburgh 22, Pa.

Induction furnaces for ferrous and nonferrous alloys and other induc- n heating equipment are detailed in a 24-page booklet explaining the inciple of induction heating, shows its effectiveness by means of photos d diagrams. Various types of induction furnaces and heaters are dia- ammed. Pictures of actual installations in many parts of the world are own. Ask Tom Lucier, Brown Boveri Corp., 19 Rector St., New York, r "Induction Heating at Medium and Main Frequencies."

Industrial drying ovens are the subject of Bulletin DO-61, recently pro- ced by The Carl Mayer Corp., 20800 Center Ridge Road, Cleveland 16. scribed are various types of installations for paint and enamel drying, bber curing. Carl Mayer's exclusive Slotted Panel system of construction explained. Carl Mayer, Jr. will send this illustrated folder on request.

The line of Barkling **heat treating and melting furnaces** is described in atalog 106. The 78-page booklet describes the company's system of stand- dized units, gives complete information on design, fuel and insulation well as detailed facts on auxiliary equipment. Write to Ajax Electric o., Frankford at Delaware Ave., Philadelphia, Pa.

Refractory castables manufactured by the Refractories & Chemicals Div'n Kaiser Aluminum & Chemical Corp. are described in a 26-page illus- ated catalog. Besides listing and describing the various castables, their arying characteristics are arranged in chart form; their specific applica- ons are also given in a chart; mixing and installing directions are also etailed. Write to Walter C. Welsh at the Refractories & Chemicals Div'n, 00 Lakeside Drive, Oakland 12, Calif.

Die Casting machines and trim presses made by B & T Machinery Co., iv'n of Greenlee Bros. & Co., Holland, Mich., are covered in Bulletin -803. Specifications for the company's hot and cold chamber machines re listed. Standard optional equipment and special optional equipment re also listed for the machines which are built in tonnages from 125 to 000 in nine sizes. General information is also given on the B&T trim resses; specs for the 28-ton unit are given; standard enquipment is listed. H. Petter, Jr. will send the brochure; write him at 217 W. 8th St.

Radiant Wall crucible and pot furnaces for die casting operations are escribed in Bulletin No. 590, a new data sheet prepared by Lindberg- isher Div'n of Lindberg Engineering Co., 2446 W. Hubbard St., Chicago 2. Sheet lists advantages of this type of equipment; gives scale drawings nd related dimensions of seven capacity sizes. Ask C. H. Stevenson for this ulletin.

Induction heating equipment as designed by Ajax Magnethermic Corp., oungstown, Ohio, is detailed in an 8-page brochure recently prepared y the company. Three designs of melting furnaces and one automatic ouring furnace are illustrated, accompanied by technical data. Also cov- red are frequency converters, motor generators, controls and heating sta- ons; fixtures and material handling equipment; vacuum melting and

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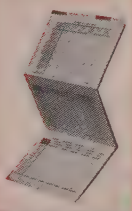

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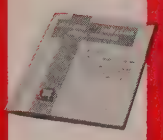

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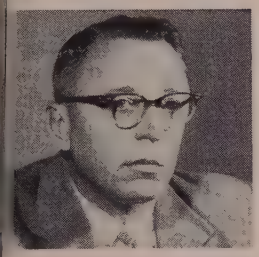

Burger Boat Co., Inc. President, H. E. Burger says: "Surface preparation is 80 percent of the paint job. Alodine has been our surface preparation since 1955."

-building at Burger Boat Company's Manitowoc, Wisonsin yards is the world's largest aluminum yacht, an 3-footer which will use 21 tons of aluminum in its conruction. Standard surface preparation for painting on his sea-going queen and *all* Burger aluminum craft—mchem Alodine conversion coating chemicals.

s the leading metal builder of custom and semi-custom leasure cruisers and yachts over 60 feet, Burger craftsnen must produce the ultimate in boat construction and ppearance to meet rigid customer specs. Burger executives are convinced that Alodine helps contribute to end product improvement in their boats, produces the base or a painted surface that will adhere and last. With the price of paint failure on a single aluminum yacht running between $6,000 and $7,000, to remove paint and start all over, Burger takes no chances with their high quality reputation.

Burger paint personnel find Alodine safe, easy to use and apply to large surface areas. The gold coating produced by Alodine permits visual inspection, makes it easy to spot "misses." Typifying this quality boat producer's viewpoint on pre-paint importance is the statement by Elias Gunnell, Vice President and Partner —"You can't permit paint loss to occur any more than you can permit a structural defect to show up in the boat."

Whether you're producing aluminum nails or yachts—or anything in between—you have a use for Alodine to make your product more durable, more attractive and more salable. Contact your local Amchem Representative, for details, his business is metal protection!

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Burger craftsman mixes Amchem Alodine solution preparatory to applying on hull of the big 83-footer.

Alodine is brushed on to surfaces of aluminum 83-footer which exceeded length of building, necessitated knocking out wall to accommodate prow.

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Write for Bulletin 1424C, gives detailed technical specifications on different Alodine chemicals available for pre-treating aluminum.

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degassing equipment, induction billet heaters and many other types of auxiliary equipment. Write to James K. McLaughlin for this.

Foundry products designed to aid in the production of better aluminum and magnesium alloy castings are listed and described in a new bulletin of Foseco, Inc., Box 8728, Cleveland 35, Ohio. The products are listed in chart form — names the product, gives the form in which it is supplied, describes the production problem which it is designed to solve, then cites advantages in its use. Ask Jack Morgan for "Foundry Products and Services."

Technical data on anodizing dyes marketed in the U. S. by Carbic, Hoechst Corp., 270 Sheffield St., Mountainside, N. J., are contained in new catalog supplements prepared by the company. Carbic is sole American distributor for Durand & Huguenin S.A., Basle, Switzerland, manufacturer of colors for anodized aluminum. For information on five new homogeneous, light-fast colors recently developed, ask for Supplement 3207.

Facts on polishing and buffing compounds of Frederic B. Stevens Inc., Detroit 16, Mich., are contained in a special booklet which describes the company's laboratory counseling service. Included in this 16-page illustrated booklet are directions for testing, polishing and buffing compositions in the plant; product recommendations for plated and unplated surfaces; how Stevens' composition cakes meet automatic buffing requirements; and a catalog of the company's products. Ask William G. Anderson for this booklet.

"PT Process Licks Casting Shrinkage" is the title of an article in the Asarco Digest, external house organ of American Smelting and Refining Co., 120 Broadway, New York 5. "Tenzaloy Boat Trim Sparkles on Nation's Waterways" is another feature in the same issue. The first article shows how Asarco's new "pressure-tight" refining process minimizes the normal 5% volume decrease when cooling from liquid to solid state. The other article is a case history detailing the use of this high strength alloy by a Midwest foundry that specializes in boat hardware. E. Friedlander, at Asarco's Federated Metals Div'n, will mail Volume 2, No. 2 of the Digest to you.

Aluminum and steel tubing in all sizes are cataloged in a new booklet published last month by Kilsby-Tubesupply, 2501 S. Malt Ave., Los Angeles 22. Size and price lists cover carbon steel tubing and pipe, alloy steel tubing, steel tubular shapes (squares, rectangulars, ovals and streamline), stainless steel tubing and pipe, aluminum tubing, pipe and Holobar. Current military specs for steel and aluminum pipe are detailed. Ask Don L. Byrnes for this stocklist.

Fact sheet on a new flat rim dish lock washer has been prepared by its developer, Shakeproof Div'n of Illinois Tool Works, St. Charles Road, Elgin, Ill. Write to J. R. Dougherty for this illustrated sheet.

Kux die casting machines are fully described in a 30-page data book prepared by the company. It gives specifications of the various sizes and models of machines available to both "make to order" jobbers and captive plants. Most of Kux's 28 new machines are illustrated. Write R. B. Kaufman, Kux Machine Co., 6725 N. Ridge Ave., Chicago 26, Ill., for this booklet.

Cold formed shapes, as produced to order by the Coldform Div'n of H. K. Porter Co., Inc., are described in a new booklet prepared by that division. The 20-page booklet describes the various cold forming methods: Roll forming, stretch bending and stamping. Also given are case histories of metalworking problems solved by the various cold forming techniques. The booklet also selects some of the nation's leading industries and shows where one or the other of the techniques comes into play product-wise. Write the sales manager at the Coldform Div'n, Detroit 34, Mich.

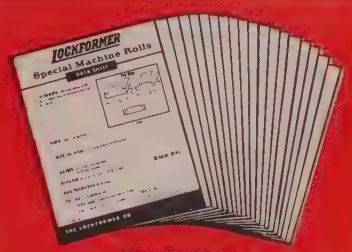
PART: Window pane channel section.
MATERIAL: .025" aluminum.
STOCK WIDTH: 2¼".
SPEED: 60-65 fpm.

PART: Flucrescent lighting fixture trim.
MATERIAL: 18 gauge CRS.
STOCK WIDTH: 2½"—run in pre-cut lengths.
SPEED: 40-45 fpm.

PART: Door or curtainwall track slide component.
MATERIAL: 22 gauge CRS.
STOCK WIDTH: Developed 2³¼".
SPEED: 45 fpm.

PART: Door or window weatherstrip.
MATERIAL: .020" aluminum.
STOCK WIDTH: 1⅛".
SPEED: 65 fpm.

PART: Toy and appliance handles
MATERIAL: .025" CRS and pre-coated aluminum.
STOCK WIDTH: 1¹¹⁄₁₆".
SPEED: 45-60 fpm.



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Casting Shipments to Climb 14% in 1961

A survey of die casters and foundries reveals that this year will show some solid growth spearheaded by die casting shipments which should equal those of sand and permanent mold combined. Overall die casting picture looks good, but American Die Casting Institute says the future of the custom die caster is bleak.

ALUMINUM die casting tonnage took the lead over sand and permanent mold in 1953; has continued to gain; and will pile up more tonnage in 1962 than the other two methods put together.

The accompanying chart (below) plotting Department of Commerce statistics for aluminum die, sand and permanent mold casting shipments from 1950 through 1960, backs up the first two statements. The final two bars are projections Modern Metals has made based on past performance, what we see in the industry, and results of a survey we took of U. S. foundries and die casters.

Of the 81 firms that responded, 25 are die casters, either job shop or captive. For comparison purposes we will separate the answers into two groups —die casters; and foundries who produce sand and permanent mold castings.

In answer to our first question, 27 foundries report that business looks "good" for the rest of this year, though only 23 say the outlook is equally as bright for 1962. "Fair" 1961 business is reported by 27 foundries "Fair" 1962 business is anticipated by 26. Four foundries say business looks "poor" for the rest of the year and that 1962 looks no better.

In the die casting group, 11 say the remainder of 1961 will be "good;" that 1962 should continue in the same manner. Thirteen die casters report "fair" business conditions for the rest of 1961 and on into 1962. One die caster is in trouble; says poor business will continue next year.

Most of the firms surveyed (76) produce castings for others; while 5 do so for their own products. Thirteen answered that they cast parts for themselves as well as other manufacturers.

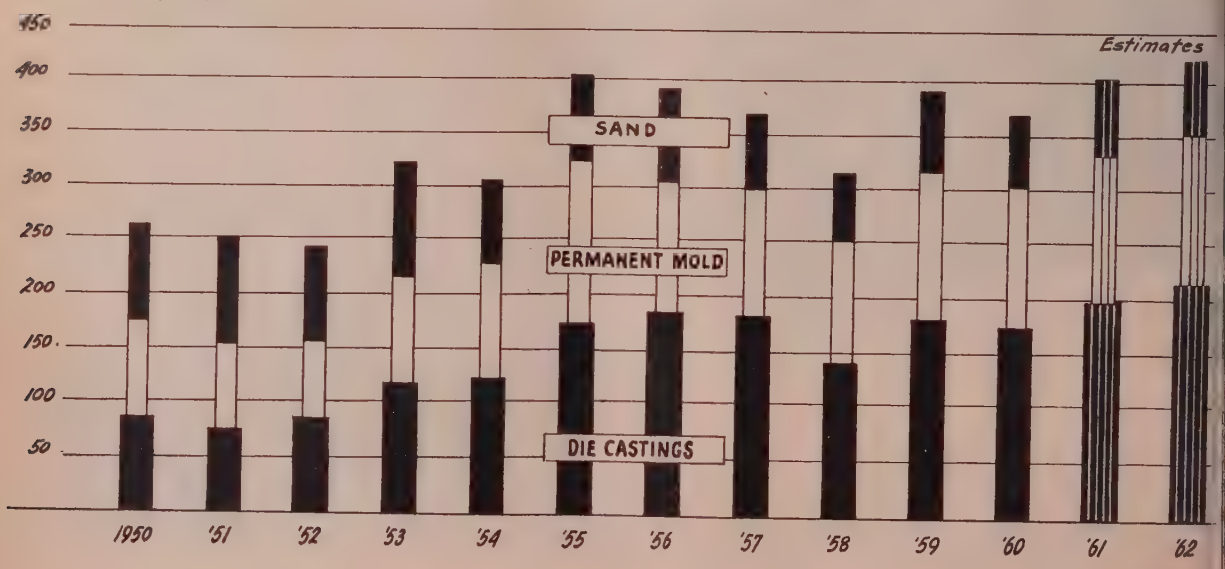
The most revealing replies were to the questions: "How much aluminum did you consume in 1960? How much do you expect to use this year?" We received 77 answers—25 of them from die casters. Adding up all the replies, we came up with a total of 59,016 tons of aluminum used in 1960. And next year looks good, with a 13.9% increase 67,228 tons anticipated.

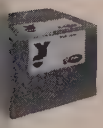
Especially significant is the fact th the 25 die casters who answered us 43,908 tons of aluminum last year, 74.4% of the total reported by all spondents to the survey. The die cast also expect a 13.9% increase next ye to 50,037 tons. This would represe 73% of the total tonnage predicted all respondents.

Here is a statistic important to t value of this survey. The nearly 44,0 tons of aluminum used by the 25 casters answering is equal to 24% of t 182,750 tons of aluminum the Americ Die Casting Institute says went into die castings last year. Of course, three the die casters surveyed used an agg gate of 35,000 tons of aluminum in 19

The fifth and final part of the qu tionnaire asked for comments on t aluminum castings business in gener Thirteen of the respondents made special note that business was goo Curiously, all 13 are firms located in t midwest or not-too-deep south. A f

Aluminum Casting Shipments: Die Castings Took Lead in 1953; By 1962 Will Exceed Output of Both Sand and Permanent Mol





If you think that fasteners are "chicken feed", think again. Your costs mount up when you use faulty fasteners that slow down and stop assembly operations, or cause damage to materials and tools.

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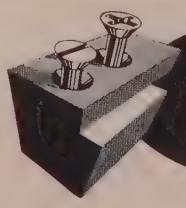

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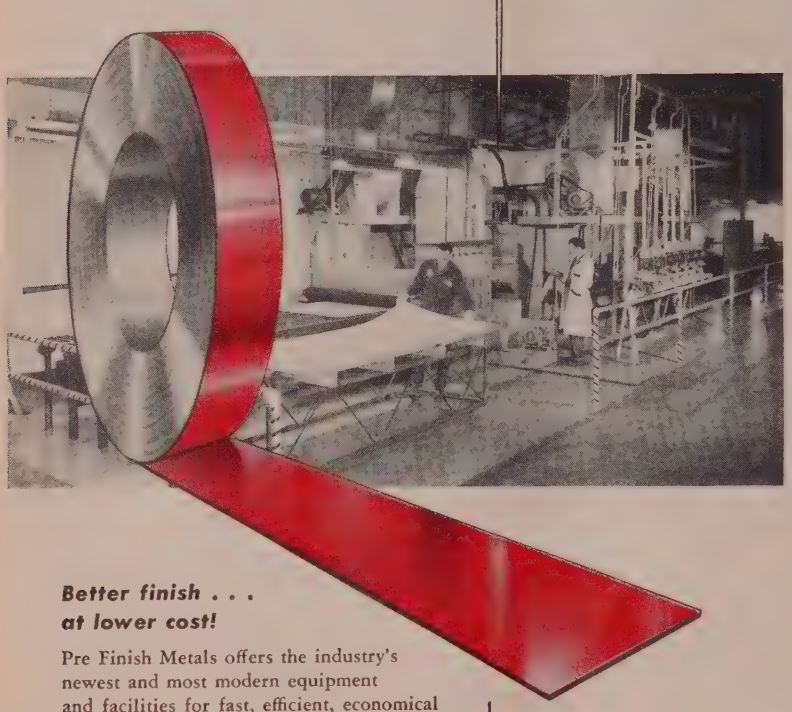

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offered some evidence of why they we enjoying or expecting an upswing.

An Illinois foundry claims his busine is getting better because he is usi "newly developed alloys which me specific needs." Another Illinoisan si ply stated that he is "quoting on a l of new dies."

'Looks Good for Future'

An Indiana sand and permanent mo foundry says quality castings have bee hurting for the past four years, b "seem to be on the upgrade over t past four months." An Ohio found doing similar work says his busine was poor for a year, "but looks ve good for the future."

Two other Ohio foundries say the are counting on "new markets to b developed for castings among manu facturers who are planning new pro ucts."

Finally, an Arkansas die caster repor that "business is getting more compet tive. This causes casting users to "risk a cheaper source of castings, somethin they wouldn't normally do. We expe our business to increase because of th factor alone."

Unfortunately, all comments we not hopeful ones. Nor did all respo dents feel that keener competition wa going to work to their advantage. I fact, a permanent mold foundry i Washington complains that "compet tion is holding prices down while labo is driving costs up."

A Missouri sand and permanent mol foundry echos the idea. "There are to many alley shops being run by ex-mold ers rather than businessmen," he assert "This causes unsound pricing."

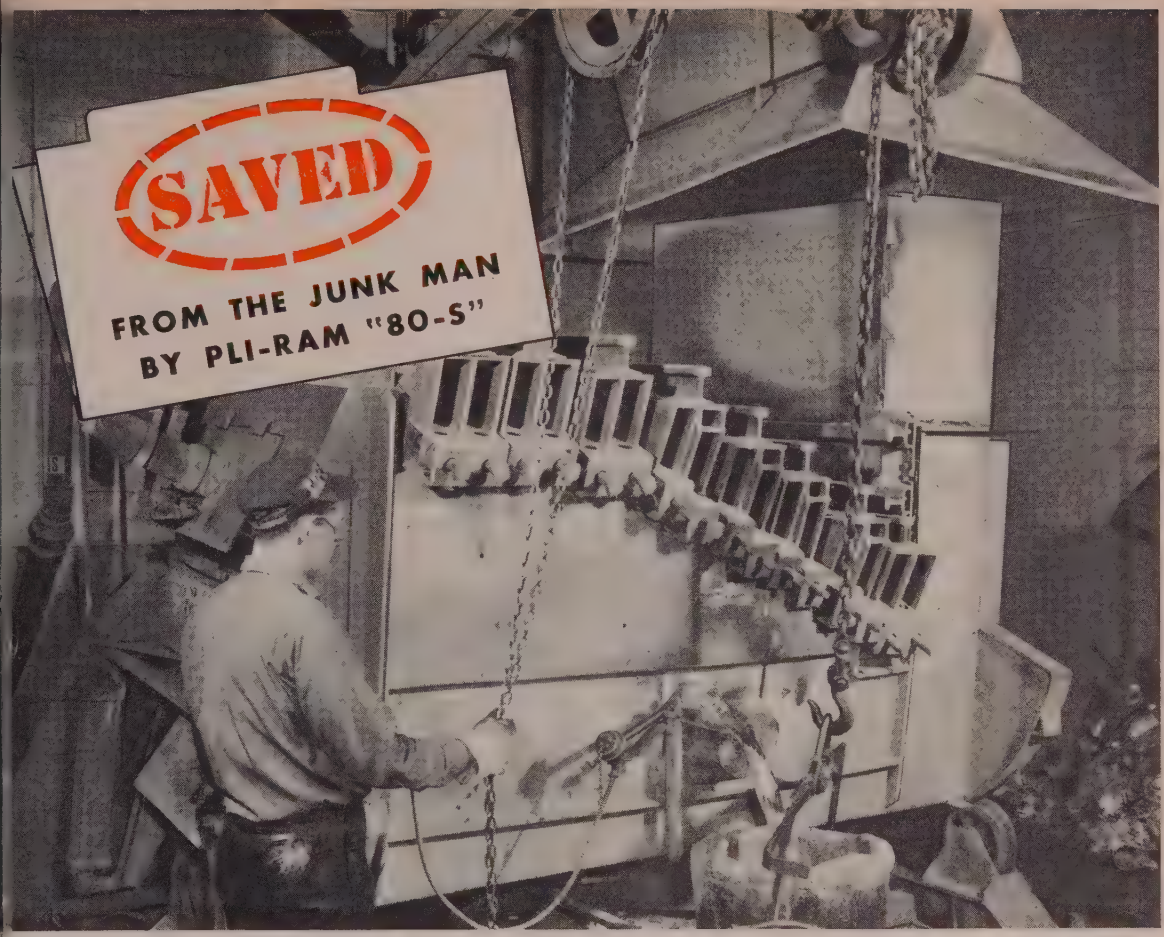
A Chicago firm has a similar com plaint: "Lower labor costs outside th Chicago area are taking much wor away. Many foundries are cutting price just to get work with no profit. Thi is hurting the entire industry."

'Expecting Profit Squeeze'

A California foundry is "expectin further profit squeeze because of pric cutting and rising costs." He adds tha "small foundries need cost education. Similar laments are heard from Illinoi Indiana, New York and North Caro lina shops. An Ohio die caster believe competition and price cutting "will onl settle down when captive auto opera tions are stabilized."

Now that we've examined some o the brighter, as well as duller, aspect of the casting industry in general, let review the 1960 statistics on die castings as reported by the ADCI.

Traditionally, a year's early month —during which new car sales were gauged—proved a good indicator of how die castings would fare. But things hav changed and brisk cars sales no longe



CUTTING UPKEEP 42% GIVES FURNACE NEW LIFE

dvance Tool & Die Casting Co. of Milwaukee ›ves quality lining less costly, less troublesome

:ore installing Pli-Ram '80-S', we were ready to junk our aluminum ing furnace," *reports the Plant Superintendent.* "We repeatedly tried r types of linings. None lasted more than a year."

Besides the re-linings, frequent in-between maintenance was a headache. contamination reduced aluminum fluidity, clogging our die casting hines. Before scrapping the furnace, we decided to see if a quality lining ld pay."

Ve installed Pli-Ram '80-S' in the sidewalls, the door, and the furnace om. That was 2½ years ago, and the lining's still in place. We've had no ıtenance, no metal contamination. Our cost per month of service is n 42%."

PLI-RAM "80-S", used in the Stroman tilting furnace pictured, is a high alumina ramming mix that forms a dense, stable monolithic lining. It's non-wetting, with excellent resistance to aluminum penetration and aluminum oxide build-up. It's one of a complete line of Plibrico refractory products formulated to serve the furnaces of industry effectively and economically.

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NEW CATALOG 68 covers Plibrico plastics and ramming mixes, giving advantages, characteristics and applications.

mean busy foundries. The die casters are suffering from "compactitis," a malady caused by the trend to smaller cars calling for fewer and smaller die castings. (Close to 30% of all cars produced last year were compacts.)

A good example is the 1960 model year when 6.8 million autos, or 19% more than the previous year, were made. But while car production was higher in '60, die casting shipments were higher in '59 (see chart on page 30).

The home appliance field, another die casting bulwark, also suffered last year, according to David Laine, secretary of the ADCI. Laine also repeats a common complaint: "This fall-off in consumption, combined with higher metal costs, brought on a profit squeeze for die casters which was further intensified by unsatisfactory and unsound die castings price levels."

'Hot Metal Deals Hurt'

Laine also feels that molten metal contracts between the primary aluminum producers and the auto makers hurt die castings. "The resultant inequities in raw material costs . . . adversely affected custom die castings levels," he contends, [and] "unpublished price concessions and related confusion upset the zinc market . . . and further depressed die casting price levels."

The effect these circumstances had on total aluminum die casting sales, however, was relatively small. Consumption of aluminum for die castings was 195,250 tons, including 12,500 tons of aluminum for hardeners in zinc die castings, says ADCI. This is 2.6% below 1959.

About 73.5% of total aluminum consumption—143,500 tons—was secondary aluminum; primary aluminum used amounted to 51,250 tons, half of which was sold in the form of molten metal to Ford and General Motors, estimates the American Die Casting Institute.

Magnesium used in die casting alloys last year was about 2500 tons, a scant 100 tons over the 1959 estimate. And the job shops' share of the magnesium business remained fairly constant—87% last year, compared with 88.8% in the three preceding years.

But the picture is bleak where aluminum job shop die casters are concerned, as hot metal contracts swell the volume of the captive die casting plants. Only five years ago (1956) job shops accounted for about 71% of total aluminum die casting production; by 1960 this had dwindled to 60%.

The biggest cut in job shop orders came from the auto makers. In 1957, the car manufacturers used 92,500 tons of aluminum castings, about 49% of all die castings produced that year. The job shops supplied Detroit with 57,000 tons; the captive plants 35,000 tons. But by last year the picture had changed radically; aluminum die casting production for autos totaled 97,000 tons, of which 59,300 tons were produced in the captive plants and only 37,700 tons were produced by the job shops.

Automotive is the biggest market for zinc die castings, too. And shops peddled 49.8% of their total zinc production to this industry. Aluminum die casting sales to car makers represented 34.7% of total job shop sales.

Laine says the high concentration of die castings sold to the auto industry makes the foundries unusually sensitive to qualitative as well as quantitative fluctuations in car production.

He is obviously correct when you examine the 1960 model year during which new applications for die castings were developed and car production was increased by 1.1 million units over '59. He says this combination of more applications and more cars should have resulted in the use of 22% more aluminum and 27% more zinc die cast. But such was not the case. Alumi gained 14.1%, and zinc only 4.7%.

As already pointed out, the vi in this context is the compact car, w hit zinc the heaviest because of elimination of much trim and de tive work. Aluminum actually f pretty well because of the introduc of die cast engine blocks in some cars produced last year.

Some comparisons show how gr the compacts have influenced the of aluminum and zinc die casting cars: The 6,115,000 cars produced 1957 required 92,500 tons of alumi die castings, or about 30.25 pounds car. Last year, 6,694,000 autos made, using 97,000 tons of alumi die castings; only 28.99 pounds a p

Back in '57 total zinc die cast amounted to 233,750 tons, avera 73.18 pounds per car; in 1960 total sumption had skidded to 183,300 t an average of 54.77 pounds.

"It should be noted," Laine "that average aluminum die casting tent per car can be expected to incr substantially, with wider adoption die cast aluminum engine blocks an a result of additional applications die cast aluminum components w help to reduce passenger car weig

"In zinc, the outlook is less favor since neither the functional part weight reducing design factors are ent. The apparent popularity of de compacts offers some encourager against an otherwise continuing in average (zinc) content per car."

TV Set Output Drops

After pointing to the unfavorabl fects of the slow home building ind on die casting sales, Laine cited sir decreases in television set output the slowdown in manufacture of equipment and business machines. net result was a drop of 15.8% in all aluminum die castings for non use and an overall drop of 14.2% zinc. This decline more than offse gains resulting from new uses, he

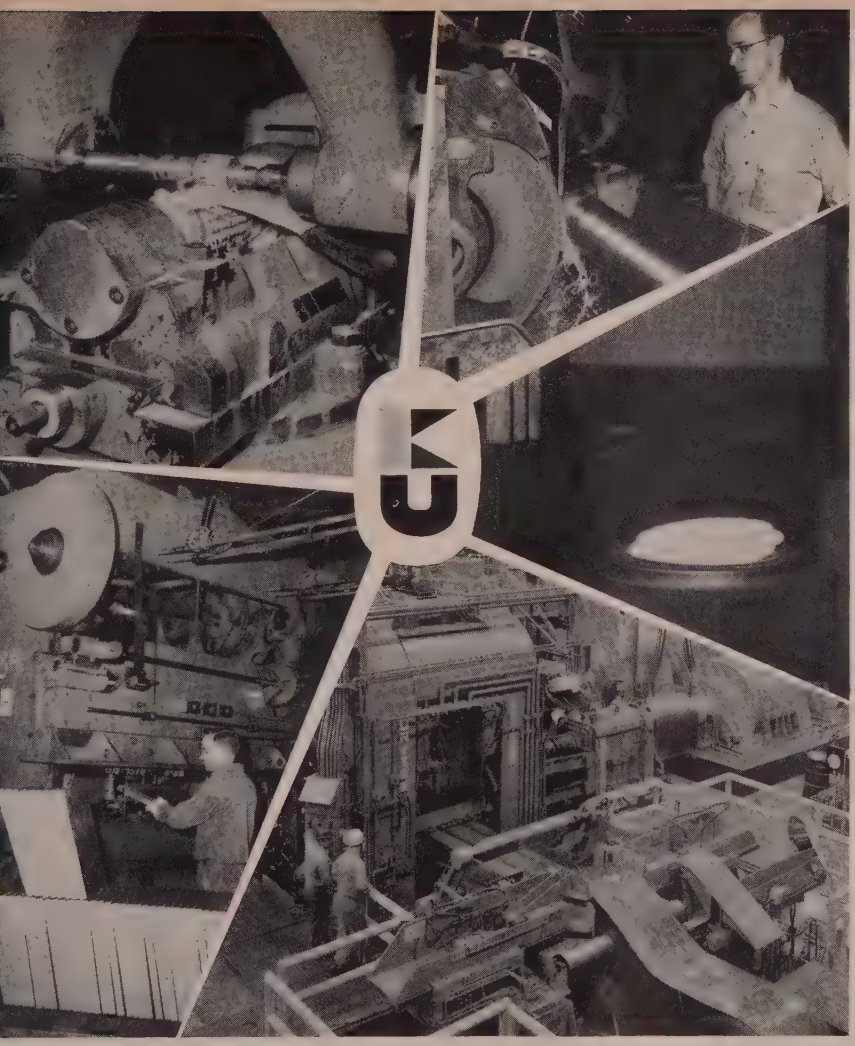
The dollar value of custom die ing shipments in 1960 totalled $ 750,000, ADCI reported. This was below the 1959 level and reflects higher metal costs prevailing in Aluminum die castings accounte $163,850,000; zinc for $207,500,000 magnesium and brass for $11,400,0 the total value of shipments.

"All the value figures exclude sale of dies and special tools o additional values of electropl anodizing or other finishing," th port added. "The estimated val such additional sales and servic $230 million. The value of captive duced die castings is not included.

END USE DISTRIBUTION OF JOB SHOP DIE CASTING SALES—1960

END USE INDUSTRY GROUPS	ZINC % Of Total	ZINC Est. Millions Of Pounds	ALUMINUM % Of Total	ALUMINUM Est. Millions Of Pounds
Agri., mining, & const. equip.	1.1	4.6	3.6	7.8
Automotive (motor vehicles)	49.8	208.6	34.7	75.4
Other transportation	1.2	5.0	1.3	2.8
Machinery and tools	9.6	40.2	14.0	30.5
Electronics, communications	1.8	7.5	1.4	3.0
Office equipment & machines	4.3	18.0	7.8	16.9
Plumbing, heating, hardware	7.8	32.65	5.0	10.85
Photographic, optical, etc.	2.9	12.15	8.1	17.5
Timing & time operated devices; clocks	1.9	7.95	1.2	2.6
Home appliances	18.1	76.1	17.3	37.5
Toys, sporting goods, personal goods & jewelry	1.2	5.0	3.8	8.25
National defense	0.3	1.25	1.8	3.9
TOTALS BY METALS	100.0	419.0	100.0	217.0

SOURCE: Reports to members of American Die Casting Institute; U. S. Government Data.



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ALUMINUM DIE CASTINGS

make new engines lighter, cool running

Outboard Marine unveils two sleek, compact power plants; establishes new division to market them.

by F. L. Church, Senior Editor

THE GIANT of the outboard motor industry has entered its bid for a sizable share of the utility engine business.

Outboard Marine Corp., best known for the boat motors built by its Johnson, Evinrude and Gale divisions, recently unveiled two completely new multi-purpose gasoline engines, the design of which exemplifies the corporation's traditional reliance on the weight trimming advantages of aluminum die castings.

Outboard Marine will market the new powerplants and related products through its newly established OMC Engines & Equipment Division. Among other products to be sold by the division are specialized 2-cycle and 4-cycle power heads ranging from 2½ to 75 horsepower.

But for the present, the star attraction is the pair of new, lightweight 4-cycle engines — a single-cylinder, 9-hp model; and a 2-cylinder, 18-hp unit. Both are air-cooled; both are virtually all-aluminum with the exception of major moving parts such as crankshaft, camshaft, etc.; and both incorporate design improvements calculated to give them appreciable sales advantages over other, well established engines for the OEM and replacement markets.

On this score, Bob Schuler, sales manager of the new division, exudes confidence. "Pound for pound, these babies were built to out-perform other engines of their power rating that are currently available to original equipment manufacturers," he asserts. "They have a weight-per-horsepower ratio of about 7 to 9 pounds per horsepower, including starter housing and air cleaner. Other comparable engines have ratios of 10 to 12 pounds per horsepower."

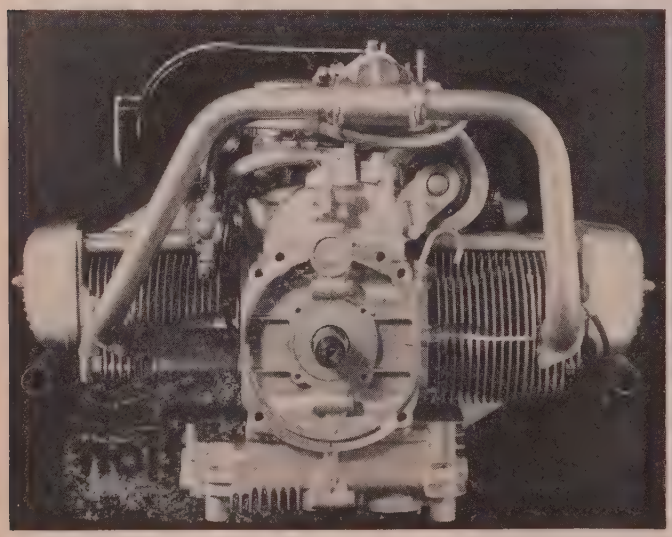
Light Weight No Gimmick

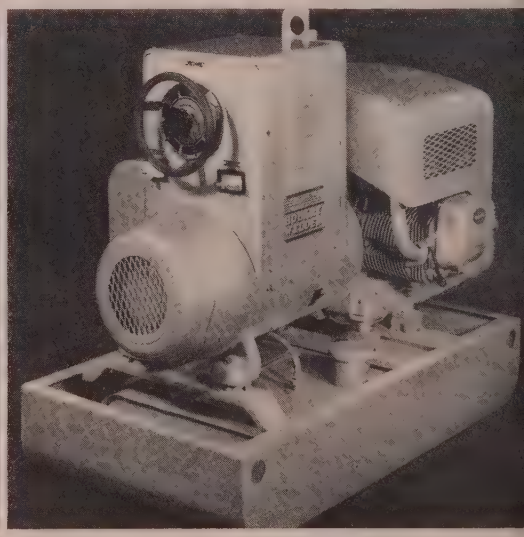
The light weight of the engines is no gimmick, according to Schuler, and it wasn't achieved at the expense of performance or endurance. "Our engines were subjected to an intensive 2-year test program before we began pilot production. We developed and tested three prototypes of each model. Test was done not only on dynamometers — 4000 rpm, full load and full throttl but also in over-the-road vehicles," explained.

Success of the program is evident the fact that the engines will be u in the 1962 line of vehicles ma factured by the Cushman Motors D sion of Outboard Marine. The origi powerplants of Cushman's mo scooters and 3-wheel vehicles were cast iron construction.

"The Cushman people were in market for a more powerful moto one that would not impose a wei penalty," Schuler points out. "The o thing they could find at that time a 7.95-hp unit, but that wouldn't the job for on-the-street use of the wheel Truckster.

"Needless to say, they participated this program. The result is a family power packages that will not only the bill for Cushman, but also se the needs of our division. But Cushm wasn't originally obliged to buy





■ *Outboard Marine's new 2-cylinder, 18-hp, 4-cycle, air-cooled engine (left), and a typical application — a power unit for a welder. Light weight resulting from extensive use of aluminum die castings promotes portability; permits use lighter, less costly mounting pads. Use of alternator inste of generator minimizes power drain.*

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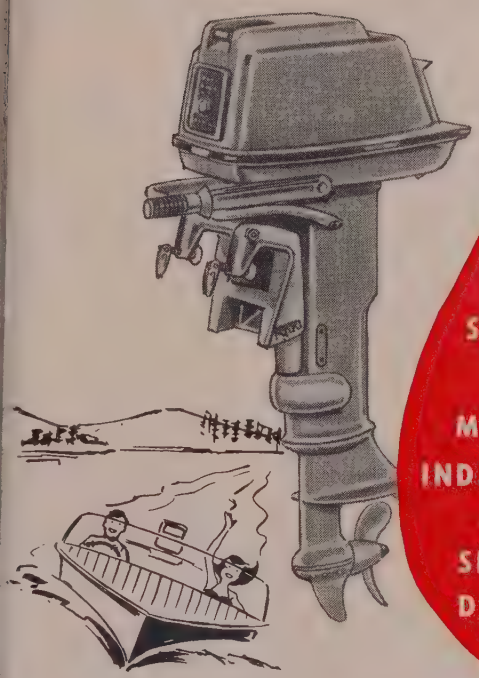

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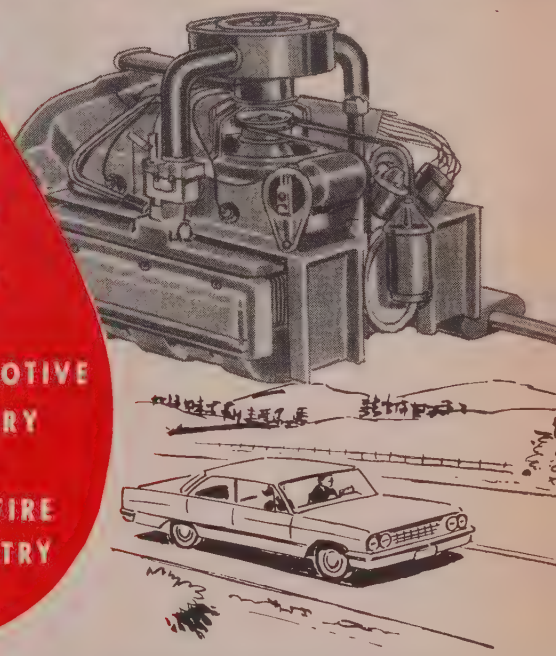

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QUESTION: What is the most efficient lubricant for machining aluminum and zinc die castings?

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engine built by the corporation," Schuler emphasizes. "They could have gone elsewhere, but couldn't find the engine they needed. They have it now."

Light weight is just one of several advantages made possible by design in aluminum die castings. Others singled out by Schuler include corrosion resistance — "a big factor in seacoast and industrial atmospheres" — and the cooler running characteristics made possible by aluminum's superior heat productivity.

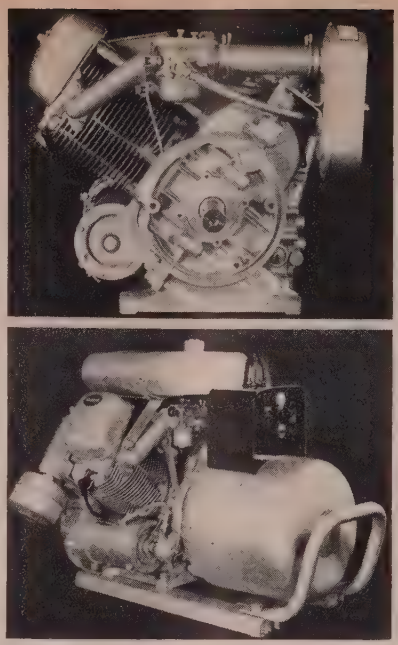
"The overhead valve design also helps these engines run anywhere from 15 to 35 per cent cooler than the usual 'L' head engines," he adds. "And then there's the appearance factor. Equipment manufacturers take pride in the looks of their products. These engines will add to rather than detract from the overall appearance of their equipment."

Die casting of major engine parts offers other advantages that are less obvious. For example, nearly all holes for fasteners and openings for services such as the lubrication system are cored in. This minimizes drilling and machining; simplifies design. And the smooth surface finish and exceptional dimensional reliability of aluminum die castings not only eases clean-up and machining, but also economizes on metal.

Finally, die casting is inherently a high volume process that holds down unit costs on mass produced products such as these engines.

The castings for the new engines are produced at the Johnson Division's huge die casting plant at Waukegan, Ill. With more than 100 casting machines under one roof, it is the largest captive aluminum die casting facility in the world. It is here that nearly all aluminum castings for the Johnson, Evinrude and Gale outboard motors are produced.

In the melt room, scrap and ingot are melted and alloyed in large Ajax induction furnaces (or in gas-fired reverbs, in the case of plant scrap containing inserts), then checked for composition by a quantometer. Molten alloy is supplied regularly to the Ajax induction holding furnaces stationed next to each die casting machine.



■ ***Single-cylinder, 9-hp OMC engine (top) and a typical application — an electric generator. Majority of parts are interchangeable with the 2-cylinder engine. The condensor, points, timer, other accessories are readily accessible, simplifying field maintenance.***

Approximately 23 aluminum die castings are used in the single-cylinder engine; about 30 in the twin. Of these, the crankcase castings are probably the most interesting. In both engines, the crankcase is cast in two parts. This not only avoids casting problems and insures greater soundness of the cast structure, but also simplifies maintenance of the engine in the field.

Alloy for crankcases is 380, an aluminum-copper-silicon composition with good as-cast strength, excellent fatigue strength, sufficient fluidity for moderately thin sections, and adequate corrosion resistance for most applications. It also boasts good machinability and retains mechanical properties at elevated temperatures. (Tensile strength ranges from 45,000 psi at room temperature to 37,000 at 300°F; yield strength from 26,000 to 25,000 psi; elongation from 2% to 4%.)

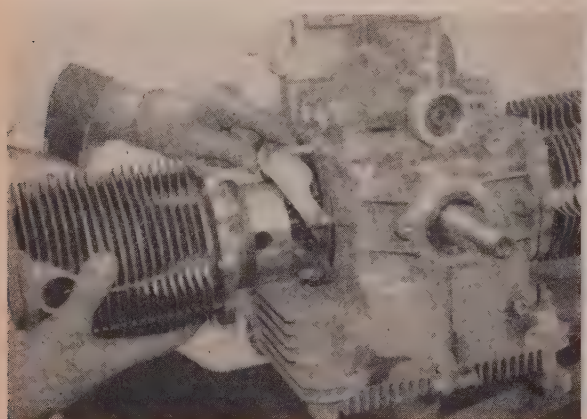
To die casting engineers at Johnson these engine parts posed no serious problems. "A few came up during development, but we solved them without much trouble," commented one Johnson man. "These castings aren't nearly as difficult as several parts in our outboard motors. Of course, the decision to cast the crankcase in two halves avoided many problems."

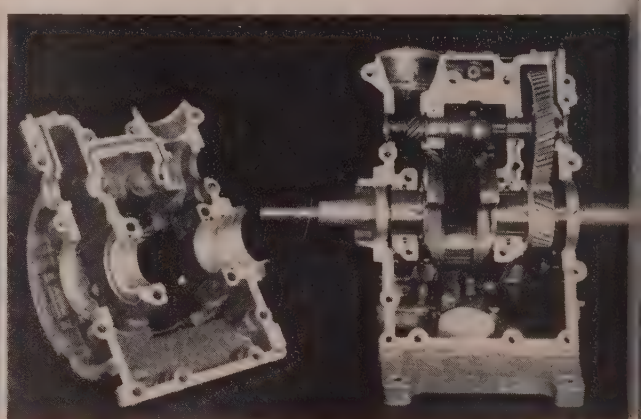
The crankcase castings for the 18-hp engine are produced on a 750-ton Lester Phoenix machine at a rate of up to 60 per hour when the operation is running full blast. The larger casting (for the half of the crankcase having oil pump, timer, etc.) weighs about 14.4 pounds with gates and runners; 10.4 pounds after cleaning. The smaller half weighs 10.4 pounds before trimming; 7.1 pounds after gate and runners are removed.

The die for the larger half has four hydraulic slides (top, bottom and both sides), which pull some 30 cores. Most of the cored holes are for fasteners, but major ones include openings for cylinder, main bearing, oil pump, timer, etc.

Actual casting operations follow normal practice. One man tends a machine; operates the controls; removes and inspects the casting; and sprays the die with an aluminum-pigmented lubricant. He also hand ladles metal into the shot chamber, generally tends to the holding furnace (skimming dross, etc.) and cleans the die before each shot.

Casting of crankcase halves for the





■ ***Details of engines. Easy disassembly of the twin is shown at left. Ring compressor is being removed after piston has been inserted into cylinder. Disassembled view of 9-hp engine shows details of crankcase castings, steel-backed babbit bearings, crankshaft, camshaft. Both engines have positive displacement gear pump, with full pressure lubrication.***

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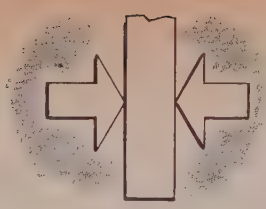

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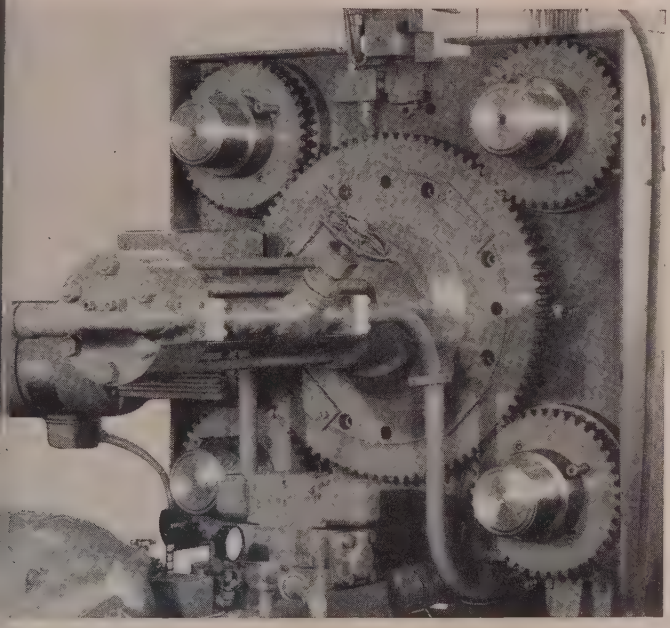

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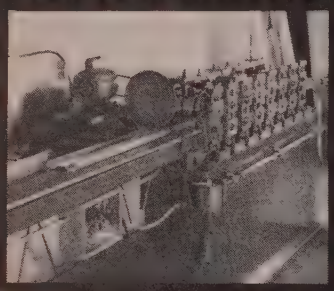

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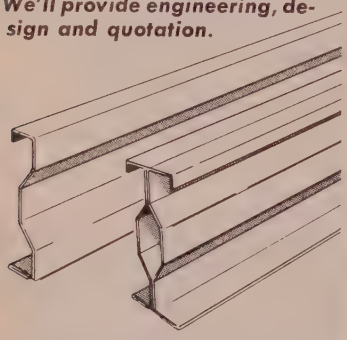

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single-cylinder engine is generally similar (the actual castings are shown on page 38). In this unit, the cylinder is offset 35 degrees from horizontal (minimizes vibration caused by "bottoming"). The lower half of the crankcase weighs about 11.4 pounds with gate and runners; 8.84 pounds after trimming. The top half weighs about 7 pounds before trimming; 5.2 pounds afterward.

Cylinder castings, with cast-in iron liners and integral cylinder heads, are identical for both engines. The cylinder weighs 10.88 pounds with gate and runners; slightly over 7 pounds after trimming. The die cast aluminum pistons are also identical for both engines and are cam ground to allow for any thermal expansion and contraction during operation of the engines.

Cleanup, machining and finishing of the castings are not complicated—mainly because of the close dimensional tolerances and complex cast-in detail possible with the die casting process. Gates and runners are die trimmed off the crankcase castings.

Machine Scrap Light

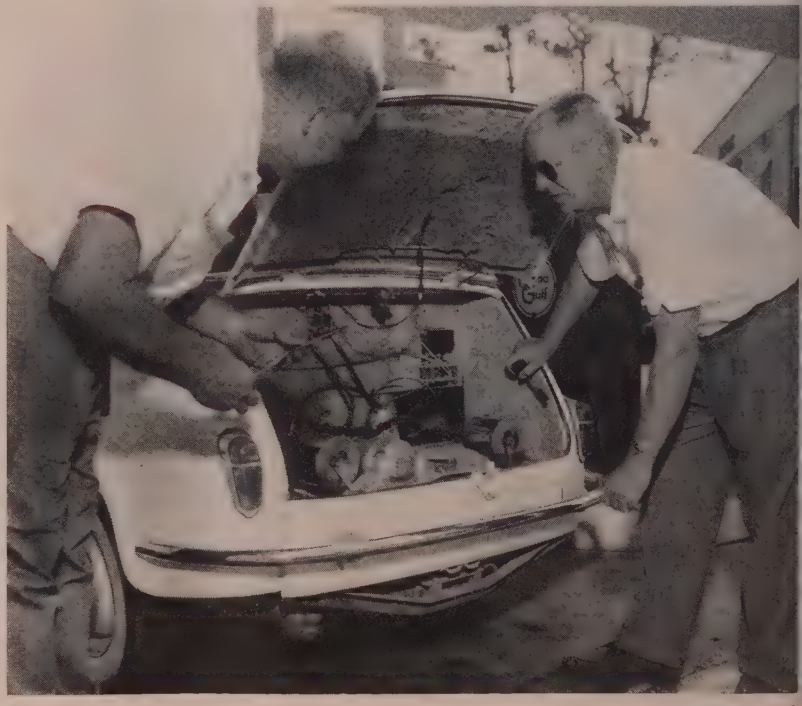
Mating surfaces of the two crankcase halves are machined to precision flatness (this eliminates gaskets; only a brushed-on mastic is needed to provide an oil-tight seal). The halves are then bolted together and main bearings and other internal surfaces are machined. Two tapered dowel pins insure accurate alignment of crankcase halves if engines must be dismantled for maintenance in the field. Metal removal in machining rarely exceeds 1/32-inch.

All crankcases are pressure tested. Finishing is confined to shot blasting, which imparts a uniform texture and surface appearance, plus a light chromic acid etch to enhance corrosion resistance and provide a base for any subsequent finishing by the customer.

Anticipated applications for the new engines run the gamut from agricultural equipment to welders, from railroad service carts to power generators for amusement parks, from starters for big diesels to truck refrigeration units. Various government agencies are also considered good prospects.

"At present we plan on using the services of part of Outboard Marine's national network of parts distributors, plus our service stations that service all OMC products, to handle the servicing and small unit sales of these engines," explained Frank S. Fenton, manager of the OMC Engines & Equipment Division. "Large volume sales will be negotiated directly with the sales personnel of our division.

"A prime reason for this is that we contemplate a 'tailored power program' for the OEM market; we plan on modifying the engines to meet particular customer requirements. Thus, we envision a close working relationship between our staff here at Waukegan and the engineering, purchasing and management personnel of the customer."



■ *Extensive test program included road tests. Here, a 2-cylinder engine, fitted with twin carburetors, powers a Fiat 600 at corporation's test center in Florida. Only spark plug and ignition maintenance were needed after 700 hours.*

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Which Aluminum Casting Process?

Sand – Plaster Mold – Permanent Mold – Die

Here are the basics of the casting methods most commonly used with aluminum, and some pointers on how to select the right one for a given job.

by W. R. Butler, Castings Manager; S. L. Fahnestock, Industrial Design Manager, Aluminum Co. of America

PROPERLY applied casting techniques offer the manufacturer fast, economical production and a flexibility of design unmatched by any other metalworking process for it is the only fabrication method in which molten aluminum is transformed directly into a finished product.

The theory of casting is the simple combination of only two essentials — molten metal and a mold to hold the metal while it solidifies and cools. But the technology is complicated and the factors which determine what casting process and what alloy to use, demand careful study.

But before discussing process and alloy selection, and the variables which dictate their use, let's briefly examine the commonly used casting methods — sand, plaster, permanent mold and die.

Sand casting is the most elementary of all foundry methods in terms of equipment and facilities needed. For this process, a pattern is made from which a sand mold is formed. Cores providing interior contour are similarly shaped. Molten metal is poured into the sand mold, which is broken away from the casting after the metal solidifies. Herein lies the method's main limitation; new mold and cores must be made for each pour.

The sand technique is the most versatile foundry method, primarily because of its universal adaptability. In production, the process is most often employed for parts of relatively small quantity or relatively large size. Actually, there is no maximum size of sand castings; aluminum parts weighing over 18,000 pounds have been poured.

Plaster mold casting is a relatively recent modification of the sand method, but has achieved status as a separate technique. It employs an expendable mold and cores, but replaces sand with a material such as gypsum plaster. After the metal has solidified, the plaster is broken up and removed.

In comparison with the sand mold, the plaster mold provides extremely fine dimensional accuracy, sharp reproduction of minute detail, and a finer surface finish. Possible intricacy of internal detail is greater than with other major casting methods.

Permanent mold casting employs permanent metal molds, with gravity fill of metal. The same mold can be re used to produce thousands of castings —a cost advantage over sand casting.

In this process, metal cores are fre quently used. These cores can be col lapsible, and open like an umbrella to provide undercuts in the casting. However, it may be necessary to use sand or plaster cores to overcome design limitations inherent in a metal core; this is semipermanent mold casting.

Recent developments permit introduction of metal into a permanent mold under slight pressure in some situations, resulting in improved flow within the mold and around core elements.

Permanent mold castings have smoother surfaces, are stronger and sounder than sand castings. Castings having excellent pressure tightness may be produced by this method.

Die Casting is the most economical of all methods for long production runs. In this process, molten metal is injected into a metal die under pressures as high as 15,000 psi. Die castings are produced at high rates in batteries of machines using long-life molds, which offer accurate and uniform reproduction.

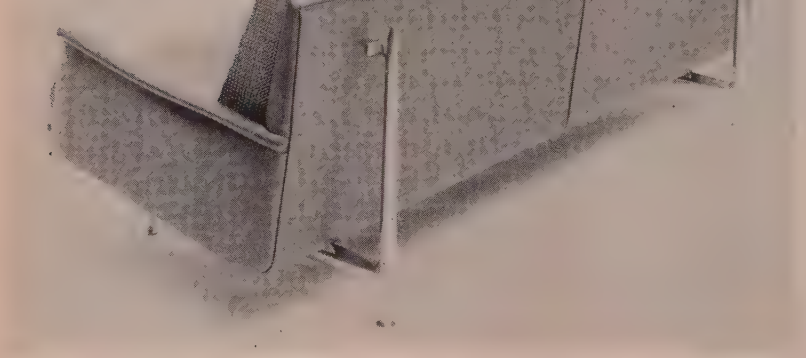
Compared to others, die castings have superior surface detail and finish; little or no machining is required. Size is limited only by casting machine capacities, which are increased constantly.

Die casting in general, permits thinner walls, sharper inside corners, and more abrupt section changes than other methods. And new aluminum alloys and better casting techniques have made possible die castings of greater strength.

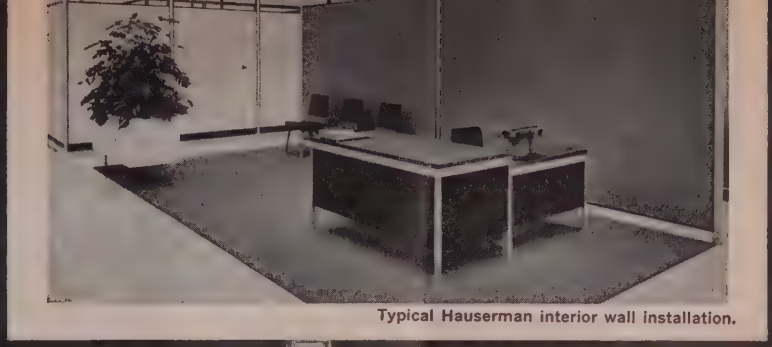
Other casting techniques are used with aluminum, but to a minor degree. These include shell mold casting, a sand casting variant; precision investment castings, an expensive, delicate method of producing such intricate forms as false teeth; and centrifugal casting, wherein centrifugal force is used to direct metal flow.

Aluminum is cast to form innumerable products such as crankcases, engine blocks, machine tool casings and housings, cooling fans, food mixer housings, impellers, rubber and plastic molds, etc.

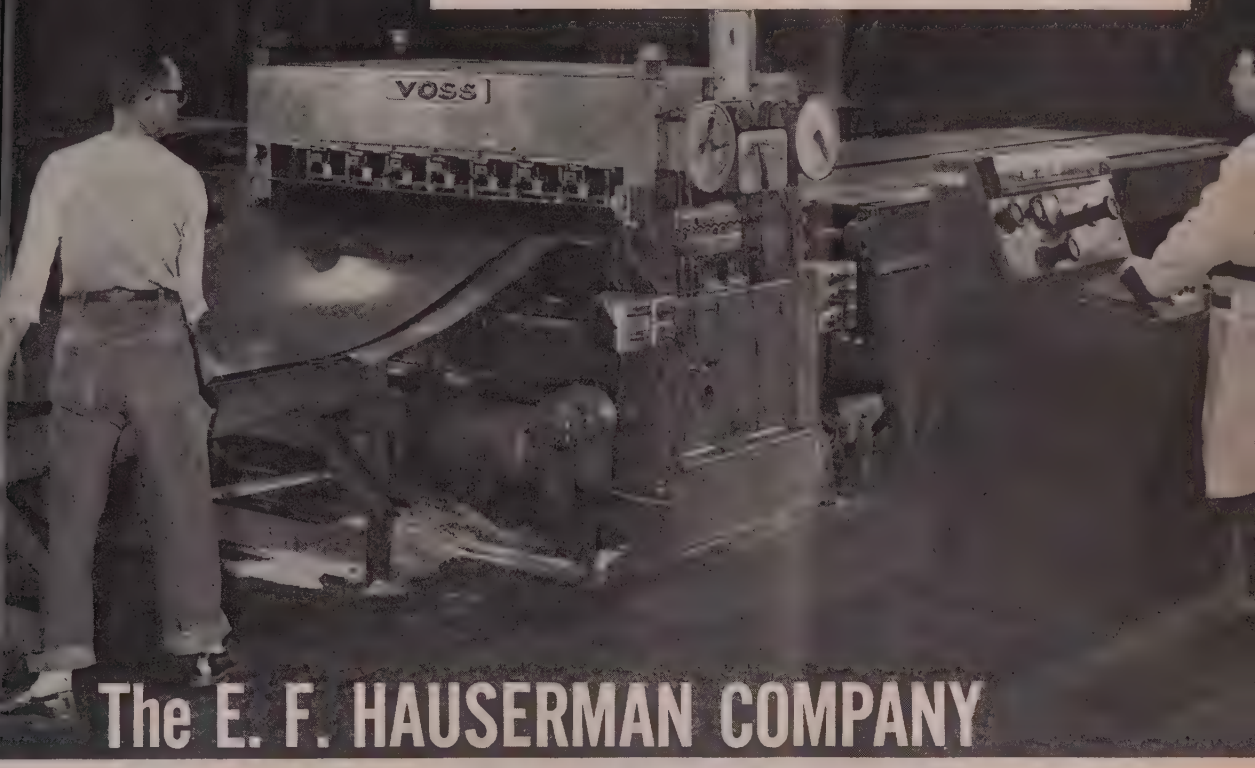
(Continued on page 44)



■ ***Example of how die castings can be made to become an attractive part of furniture design. Leg castings here are functional as well as decorative.***



Typical Hauserman interior wall installation.



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Deciding to cast these components is rather simple, but selecting the best method to produce the products in question is a more difficult, even awesome, task for the industrial designer. This is true because of the many production considerations — quantity, required strength, subsequent finishing, wall thickness, feasibility of a design for a given casting method, etc.

To better understand the intricacies of process selection we can look at the way a comprehensive aluminum casting facility handles a quotation.

First, drawings, specifications, and related information about quantities, etc. come in to the plant. A team of design engineers, tooling and production experts, and estimators pool their knowledge to recommend a specific method, as well as suggest design modifications. Sometimes a test sample is made by the sand or plaster method. The sample is then given whirlpit or fatigue tests, static tests under simulated or actual load, or one of several structural analysis methods.

Obviously, determining which technique to use is a task for the foundryman. For the designer, the significance of the differences between casting methods is that this information should be treated as a whole. It is not a matter of what one process cannot do; it is a matter of the potential offered the designer by the entire casting spectrum.

Requirements of specific parts may automatically rule out one or more casting methods. If you require a part larger than the die or permanent mold machines available, then your choice is narrowed to sand or plaster. If you require an even larger part, sand is your only choice. If you require a hyperthin wall, your choice narrows down to die or plaster methods, depending on the quantity.

Cast in Metal Molds

Generally, the designer should strive to create a part that can be cast effectively and economically in metal molds or dies; and one that is easy to remove from the metal mold after casting.

The metal mold used in permanent mold and die casting is the symbol of economical mass production of cast parts. These methods are inherently more economical for production runs of any substantial length. And aluminum, with its low melting point, is uniquely suited for forming in metal molds, and it frequently becomes economically preferable to ferrous alloys.

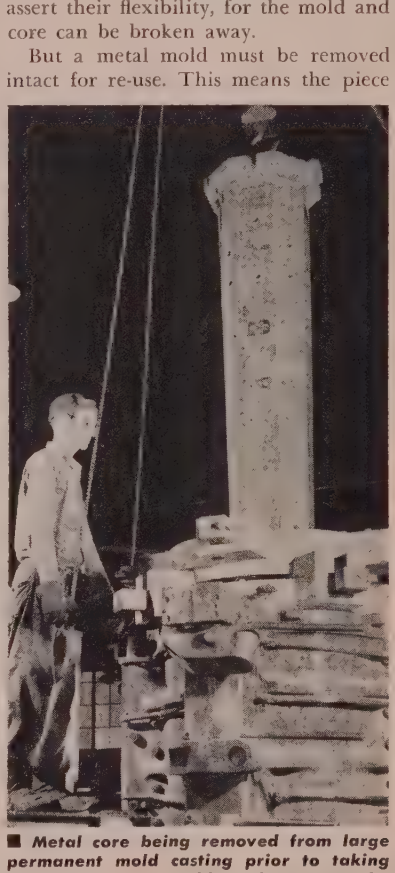
Plotted on a cost vs. quantity chart, these factors emerge vividly: If sand or plaster (or, for that matter, shell mold) castings show any cost advantage over metal mold castings in low quantities such as a dozen or so (and even this is not invariably true), these advantages must disappear when any large quantity is anticipated. Clearly, the situation is this: Either you make one iron or steel mold for hundreds, thousands, even hundreds of thousands of parts; or, you make a sand or plaster mold every time you make a single part.

No matter what advantage exists in original mold cost or equipment investment, quantity catches up. And quantity is usually a factor where most parts created by the industrial designer are considered. Where a really small run is involved, the advantages of casting in the metal mold may never appear. And the higher quantity run may possibly involve dimensions or design features that permit production only by sand, plaster, or shell molds. But generally it is best to aim toward production in metal molds.

The art of casting requires knowledge of the behavior of metal when it's molten and while solidifying.

The metal must be conveyed to the die or mold (through passages known as gates), and transported to feed metal properly where it is needed. And when the metal is chilled and solidified, the mold and core must be removed. At this point the sand-plaster-shell methods assert their flexibility, for the mold and core can be broken away.

But a metal mold must be removed intact for re-use. This means the piece



■ ***Metal core being removed from large permanent mold casting prior to taking iron mold away. Molds and cores can be re-used thousands of times in the permanent mold method.***

being cast must be designed with thi consideration in mind.

A rule of thumb for designing meta molds and dies is: Avoid undercut those design features involving a mol or metal core design that cannot b withdrawn straight — little pockets, ell or interior shelves that aren't accessibl on a direct pull perpendicular to th parting line of the casting.

(Undercuts formed by holes or unde cuts on the outer surface of the castin may be made with "core pulls.")

Of course, this is a philosophy of de sign, not an absolute limitation of meta mold casting techniques. For there ar economical ways to incorporate intriguin movable elements in mold and core Example: Automotive pistons are per manent mold cast with undercuts galore

Try to Avoid Undercuts

Furthermore, the withdrawal of mol or core can be accomplished on othe than a perpendicular. But undercut with no functional or styling necessit do present an unneeded challenge.

Other design features frequently pre sent fabricating problems. Though b no means insoluble, problems are pre sented by great variations in wall thick ness, abrupt section changes, shar angles without fillets, multiple intersec tion of several elements at a commo point, and bosses, lugs, and pads.

Problems resulting from these fea tures, if they loom large, can be solve or minimized in negotiation betwee production engineer and industrial de signer. Not so, unfortunately, wit undercuts. These often represent an im passe, since they frequently become in extricably woven into the total desig concept. Avoid them if possible!

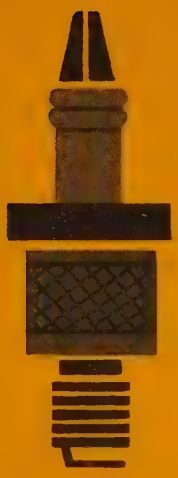
In addition to the strength given a casting by the alloy and process em ployed, plus possible heat treatment the physical design of a casting is a vital influence on the strength of th finished part.

Essentially involved are metal distri bution and stress concentrations. An not only are these considerations im portant in the design of the part, bu they also affect the inherent ability o that design to be cast effectively. A engineer can tell the designer how t create a casting that is strong as wel as esthetic.

Molten metal will envelop element placed within the mold during th casting process. This makes it possibl to incorporate inserts of other metals providing desired features such as mag netic capacity and special wearing char acteristics. In addition, holes tha couldn't be cast may be made with in serts.

The designer should remember there is no limitation to the size of a castin

from Spark Plugs



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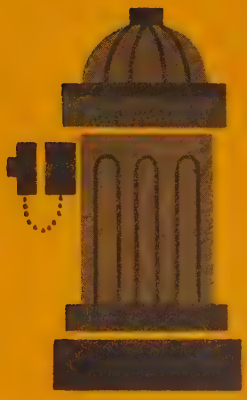

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made in a destructible mold; there are limits on the size of castings made in metal molds, and these are dictated by the production machines.

Heat treatment after fabrication of parts cast from many alloys will greatly improve their mechanical properties — yield and tensile strength, and elongation. Other thermal treatments will also relieve certain internal strains produced during the casting operation.

Die castings usually aren't too well suited to heat treatment as surfaces tend to blister. However, die castings possess as-cast mechanical properties superior to those obtained in the other casting methods.

Ribs Can be Designed In

Casting allows ribs to be incorporated into the design (it's the only forming method permitting economical provision for integral stiffening ribs in complex shapes). Ribs act as stiffening or reinforcing members, can serve as locations for bosses or pads, or as heat transfer vanes. They can also enhance part styling.

The point where the sections of a mold separate is the parting line, which may be visible on the finished part. Castings can frequently be designed so that the parting line coincides with a surface to be machined or appears at a point where it won't hinder the design, thus eliminating the need for secondary finishing operations.

Virtually no pure aluminum is cast for quantity production (the exception being certain parts in which electrical conductivity is all-important). Alloying improves aluminum's castability as much as it enhances mechanical strength.

Alloy selection is based on the needs of the part and the characteristics of the production operation. The designer and the foundry engineer must determine desired mechanical properties and corrosion resistance, casting technique to be employed, if heat treatment will be used, and the extent and type of subsequent finishing, forming, and joining operations that may be necessary.

After these variables are stated, the foundry engineer selects the material that will do the job.

Since the casting process has virtually no restrictions on shape, it is often possible for the designer to make one piece serve many different functions. Such design may result in improved styling; it almost invariably cuts costs.

With aluminum castings, finishing is frequently either unnecessary or minor in scope. The progress of the casting art is such that surface smoothness and accuracy are constantly being improved through more sophisticated production methods. As a general rule, surface smoothness and accuracy are best with die castings, poorest with sand castings.

Aluminum castings are finished by all of the techniques feasible with other aluminum forms—sandblasting, etching, burnishing, tumbling, shot peening, wire brushing, or other common mechanical and chemical finishing methods. Aluminum castings may be plated, painted, lacquered, enameled, and porcelainized.

New lacquer-type applied coatings are durable, corrosion resistant, and stable. In certain applications, these new casting coatings have outperformed anodized coatings, at much less cost.

Another new coating is fluidized plastic. It literally fuses itself to an aluminum surface, and provides a tough, heavy coat which resists scuffing, chipping, and also acts as a heat insulator.

Recent work has made possible effective clear or color anodized finishes on aluminum castings, including die castings, when a new casting alloy is used. The foundry characteristics of this alloy are relatively poor, however, and it's usually used for small castings.

Frequently used with castings are special anodic hard coatings which provide superhardness for wear and abrasion resistance.

Main problem in anodizing die castings is that flow lines resulting from movement of pressurized molten aluminum in the die are "brought out" during the electrolytic process. The lines have no effect on performance quality, and often are completely invisible before anodizing.

Texture Hides Flow Marks

Alcoa has a new process called Pebblestone which may open new die casting design doors. The new process offers a uniform, all-over texture that hides flow marks, responds attractively to color anodizing, and does so at reasonable cost.

Aluminum castings may be assembled to other castings, to wrought aluminum parts, or to other materials, by essentially all joining methods. The major types used are mechanical fasteners, welding and brazing. Adhesive bonding is rapidly increasing in importance.

Design must provide for the points where castings are to be joined with mechanical fasteners. Cast-in inserts are sometimes employed to provide threads. Rivets have been cast into die castings to permit easy assembly.

Designers may weld cast and wrought parts to produce a form economically unattainable by a single fabrication technique. The cost of welding increases with decreasing accessibility to the weld area however, so designs should permit maximum exposure of these areas.

Sand, permanent mold, and plaster castings made from a few specific alloys may be brazed. No satisfactory technique for brazing die castings has been developed. Where it can be used, brazing of castings provides design and cost advantages.

Recent advances in the quality and versatility of adhesives have been of particular interest for assemblies combining aluminum with other metals or non-metallic materials.

The excellent foundry characteristics of aluminum permit it to be cast with greater economy, more complexity of design, and by more techniques than alternative metals. But the aluminum industry is still hard at work learning more about the 5000-year-old technique.

Coming at some indeterminate time from the laboratories will be new alloys offering better strength-weight ratios (castings with ultimate strengths of 80,000 psi have been produced experimentally), better bearing properties, better finishing properties, or a combination of these.

Also in the future: New processes permitting casting of more intricate shapes, design requirements with lower minimums and higher maximums, improved cost relative to other forming techniques, multiple combinations of parts cast by two or more methods, and further sophistication of present processes; and new finishes permitting results now unattainable technically or economically, and broader application of finishing methods now limited in their scope of use.

Implicit in this discussion is the fact that — as in all production designing — the designer must reflect the needs and capacities of the process involved. Casting problems tend to require intimate contact between design, engineering, and production personnel, but the remarkable flexibility of the process provides unequaled elbow room for the designer's imagination.

The Goals Are . . .

Casting was born long before alchemy, but the pinch-of-this-bit-of-that empirical approach of the alchemist is not out of place in casting design. The goal is an optimum balance of functional and esthetic design features with production feasibility and economy. The advice available to the designer will ward off grief and open up vast areas within which his talents may be applied.

The casting processes inspire a designer and provide an unlimited potential, presenting opportunities to achieve economically results that are often otherwise unattainable.

Unfortunately, castings defy the type of precise description that would do them justice. But we can summarize by saying, "Ask a casting man if it can be done . . . and expect him to say, 'Yes,' and then prove it."

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New Casting Alloy Is Strong, Ductile Without Solution Heat Treatment

Jobbins' new Precedent 71B alloy can be stress relieved at only 700°F; retains high tensile and yield strength for structural applications such as truck components.

AN ALUMINUM casting alloy having a high, and a constant, fatigue endurance limit has been developed by William F. Jobbins, Inc., aluminum smelter, Aurora, Ill. The new alloy, called Precedent 71B, is also reported to withstand severe shock loads.

"The need for such an alloy becomes particularly apparent when one views the motor trucking industry," a Jobbins metallurgist commented. "Rail competition has sidelined thousands of highway rigs. One way in which the trucking industry can fight back is to reduce tractor and trailer weight by the use of more aluminum; this permits greater payloads."

Making aluminum castings having a consistently high fatigue endurance limit has been difficult—"a rough road mined with many booby traps"—according to the Jobbins spokesman. He offered an example.

"During World War II, a liquid cooled aircraft engine was built in the U.S. using alloy 355T6, and later, 355T71," he said. "This engine was plagued with fatigue failures. In England, a similar engine was built by Rolls Royce, using an aluminum alloy designated Rolls Royce 50. This alloy in the British engine was free from fatigue failures."

The accompanying table of sand cast physical properties of the two alloys offers the paradox of one alloy with very low mechanical properties, and even a relatively low fatigue endurance value, proving to be superior to an alloy with apparently higher mechanical properties.

The explanation for this was found in the locked up stresses in the U.S. alloy. The T6 designation of the first alloy used means that the part received a solution heat treatment. In this practice the casting was heated to near 1000° F. and then quenched in water. It was this fast cooling of the part that created the stresses.

"Locked up tensile stresses detract from the working fatigue endurance limit of the casting," the metallurgist said. "In converting to use of aluminum castings, it is a severe limitation to work to a 10,000 psi fatigue endurance limit. If a part has been designed to fatigue loads of 9000 psi, and the casting has in it a 6000 psi tensile stress, the working fatigue endurance limit of the part is only 3000 psi. It will quickly fail in service.

Sure of What They Had

"That's what happened to the American aircraft engine. In the case of the Rolls Royce engine, the alloy was not solution heat treated, which avoided locked up quenching stresses. Instead, the castings were given a fairly good stress relieving heat treatment. It meant that when British designers worked to a fatigue endurance limit of 7000 psi, that's what the castings had; and the engines did not fail because of weakness of the aluminum."

The Jobbins executive pointed out that aircraft engines are protected from shock loads by the flexibility of the wings and engine mountings which "make these members wonderful shock absorbers." An alloy such as Rolls Royce 50 could not be considered for use in over-the-road trucks, where normal fatigue endurance loads have superimposed on them severe and heavy shock loads.

Aluminum castings do not become completely stress relieved unless they are annealed at 700° F. Alloys such as 355 and 356 become annealed soft when stress relieved at this temperature and, as a result, are nearly useless in stressed applications.

"Precedent 71B requires no solution heat treatment, can be stress relieved at 700° F. to produce parts completely free from locked-up stresses," the company reports. "At the same time, it develops a combination of high yield strength and ductility as measured by percent elongation. This combination makes the alloy ideally suited for use in truck parts subjected to high fatigue loads as well as heavy shock loads.

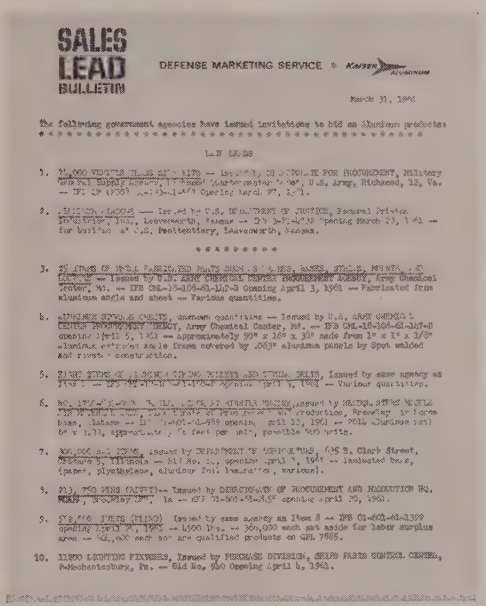
Jobbins reports that Precedent 71B has found wide use in other fields, especially in precision instrument work where, as stress relieved at 700° F, parts made from the new alloy become completely dimensionally stable.

"In the case of the American aircraft engine," the Jobbins metallurgist said, "the problem of fatigue failure was solved by going to a fairly high stress relieving heat treatment, which lowered mechanical properties to a considerable degree."

Table 1: Physical Properties of Sand Cast Alloys

	Rolls Royce 50	355T6	Precedent 71B, Stress Relieved at 700 F°.
Tensile strength	23,000 psi	35,000 psi	40,000 psi
Yield strength	14,000 psi	25,000 psi	30,000 psi
Elongation	3%	1½%	6%
Brinell hardness	60	85	90
Fatigue endurance limit	8,000 psi	10,000 psi	10,000 psi

You could wade thru all this...



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March 31, 1961

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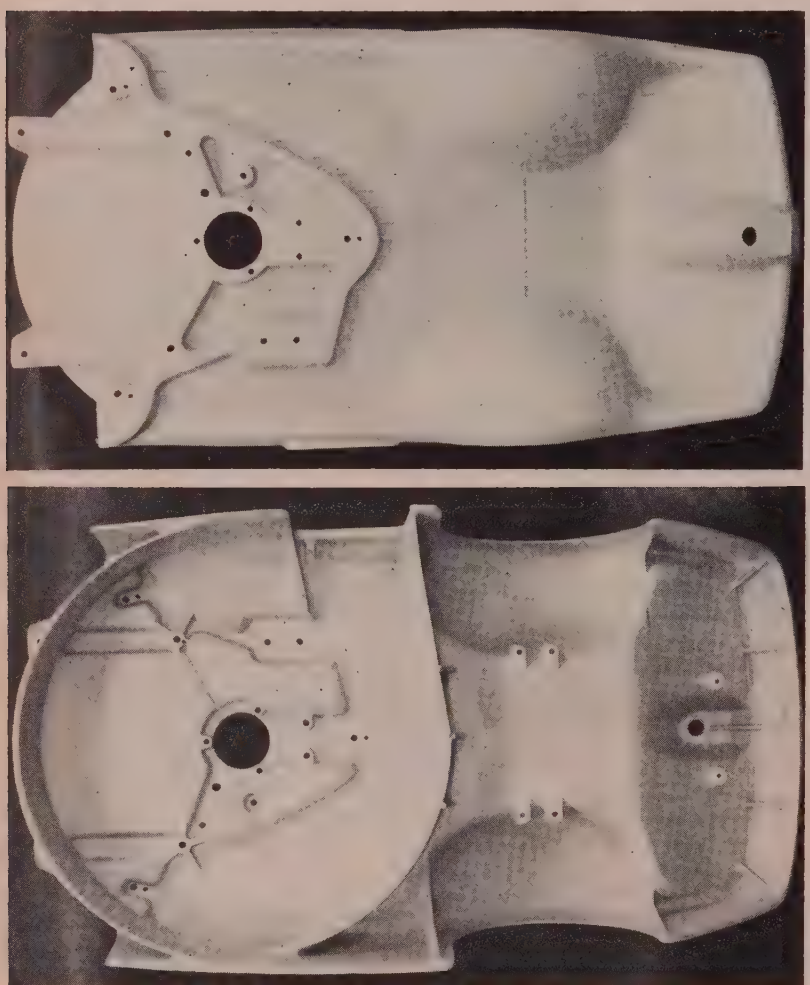
Mower Rides on Big, Multi-Purpose Permanent Mold Casting

The Mark 24 riding mower uses an aluminum casting which eliminates the need for 50 separate components and 40 fasteners. And not only is this casting functional, its graceful lines make it highly attractive.

PERCHED comfortably atop her Turf Green Mark 24, the suburban housewife can zip over her expansive lawns, clipping them neatly and quickly, with a minimum of exertion. And she'll look forward to the next trimming because the design of her riding mower emphasizes safety, comfort and appearance.

The Mark 24 riding mower is made by Porter-Cable Machine Co., Syracuse, N. Y. The unit's special design was created by Arthur J. Pulos of Pulos Design Associates, Syracuse, and the head of the Industrial Design Department of Syracuse University. He was assisted by Leland Smith and Donald Waterman, also of the university, and Joseph Kieffer and Richard Lamkin of Porter-Cable.



■ *Top (above) and underside (below) views of 46-inch by 25-inch permanent mold casting used in Porter-Cable rider mower. Top photo shows how single casting serves as main vehicle frame as well as foot rest and fenders; bottom, how same piece houses cutter blade and acts as axle and steering column support.*

The Mark 24 is a low-slung mower which was designed to minimize the danger of tipping by placing the rider on the machine's center of gravity. Also, the gasoline engine is completely enclosed and positioned so the operator sits in front of it rather than astride it. Construction of the entire unit eliminates any chance of resonant vibration caused by the motor, which aids rider comfort.

Mainstays of the Mark 24 are a permanent mold cast aluminum chassis and a fiberglass engine shroud. By combining these materials, Pulos says he has developed a mower which is more weather resistant and durable than the family automobile. Other mowers are made of sheet metal, he adds, and are subject to corrosion and vibrating damage.

Functional, Good Looking

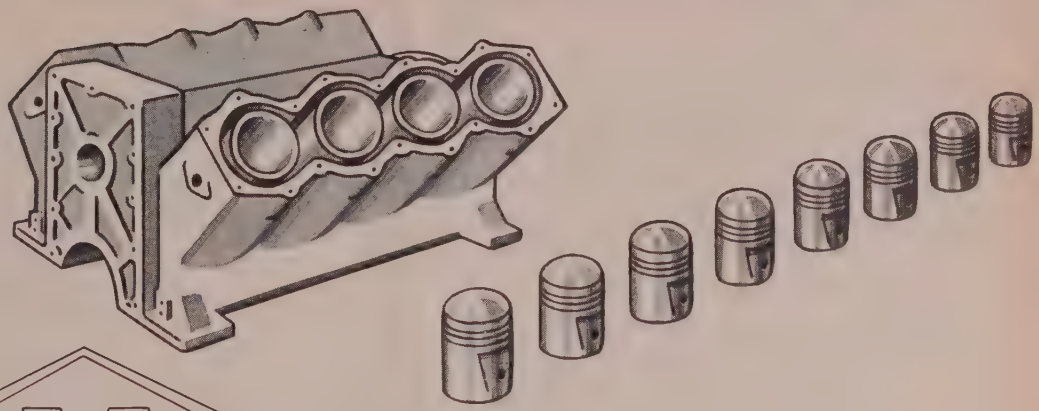
Aluminum, however, is the key to the mower's features—esthetic, functional and mechanical. And the cast aluminum chassis—46 inches long and 25 inches wide—is the secret of the quick assembly, durability and vibration resistance of the mower.

Casting the chassis in one piece made feasible the graceful lines and complex shape of the mower. But the casting process serves more than to create eye appeal. It enables the chassis to perform functions that would normally require more than 50 components and 40 fasteners. The single casting serves not only as the main frame, but also as a housing for the cutter blade and front axle, as well as the steering post.

Aluminum castings are also vital to the drive mechanism of the mower. Five die castings made by Alcoa are used to house the transmission, differential and drive axles.

The Oswego, N. Y. Castings Division of Oberdorfer Foundries, Inc., produces the big chassis castings for Porter-Cable on Oberdorfer-designed equipment. A hydraulically operated, horizontal, full permanent mold with two loose pick-up

From pistons to engine blocks...



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The designing and building of special automated molding equipment is an important part of the work at Permanent Mold Die Co. Typical of the equipment that PMD has developed for industry is this Automated Piston Molding Machine.

This machine incorporates the advantages of metal molds and cores, manual or automatic operation, and adaptability to various sizes of pistons. It has increased the rate of piston production almost 600%.

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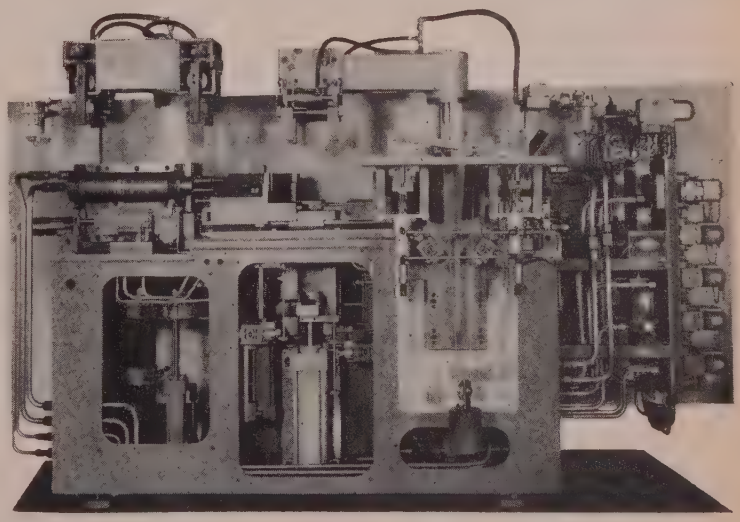

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cores is used. The mold's gross weight is approximately six tons. Oberdorfer also designed two special calrod units and gas burners which maintain mold temperature so metal flows properly in the thin walls of the large casting.

Casts 160 Chassis a Day

The Oswego Division produces 160 chassis castings a day, using No. 319 (aluminum-copper-silicon) alloy. Each casting requires a gross pouring weight of 63 pounds. Trimmed castings weigh 41 pounds—a relatively small percentage of the entire mower weight of 225 pounds.

Castings are ground and sanded with portable power abrasive belts, then painted with green enamel and dried with forced air. Painted castings are delivered to the head of the Porter-Cable assembly line which turns out a completed mower in 4½ minutes.

First, front wheels, axle and cutter blade are fastened to the chassis with standard steel bolts and screws ranging in size from ¼ to ½ inch. All fasteners are either cadmium or zinc plated, or chromate dipped. Aro Equipment Corp. (Bryan, Ohio) air powered nut and screw drivers are used to speed assembly.

Next, the steering mechanism is slipped into a slot cored to proper size in the mold. A nylon bushing is used in the slot which eliminates the need for machining. Overhead conveyors then move the chassis along the assembly line to the next station where rear wheels and the engine mounting frame are attached. Then the engine is mounted over the rear wheels.

The mower is then tilted at a 90° angle on a trunion where the remaining mechanical components are fastened by workmen operating on both sides of the machine.

The mower is then righted; the engine is given a complete test run; and finally the fiberglass engine shroud is put in place. A nameplate is then affixed and the completed Mark 24 is crated.

The Mark 24 was designed for simple, multi-purpose use. Its light weight makes it easy for anyone to manuever; the steering handle tilts forward for easy mounting, or for steering the unit while the operator walks along side it—while going under branches for instance.

The mower can also be used as a tractor to pull attachments such as a ground aerator, lawn roller, garden cart and seeder and spreader The Mark 24 is powered by a 4½ h.p. engine and can travel at up to 3½ miles per hour.

■ ***This is completed Porter-Cable Mark 24 riding mower. Notice the low-slung design and the curved lines of the unit, and how well the fiberglass engine shroud blends with the sculptured lines of the aluminum casting. Small attachment at lower right is for hooking other garden equipment to the Mark 24, which then acts as a tractor. Steering handle at front can be moved up for easy entry or to the side so mower can be steered while operator walks next to it. Safety features include low body design and placement of seat at center of gravity of unit, both of which help prevent tipping. Also note that the seat is in front of the engine.***

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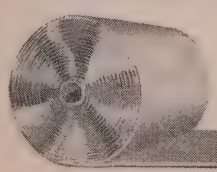

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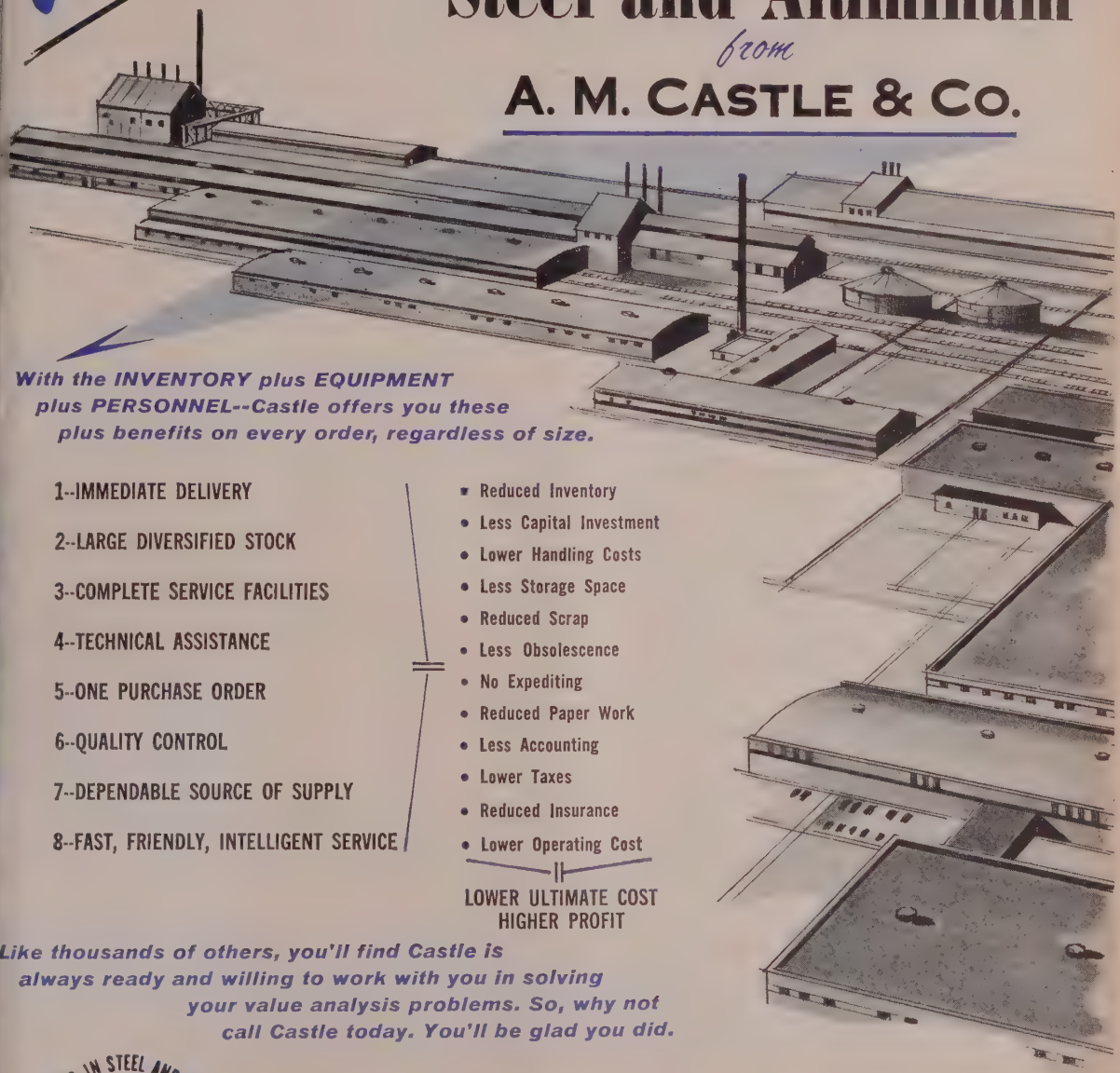

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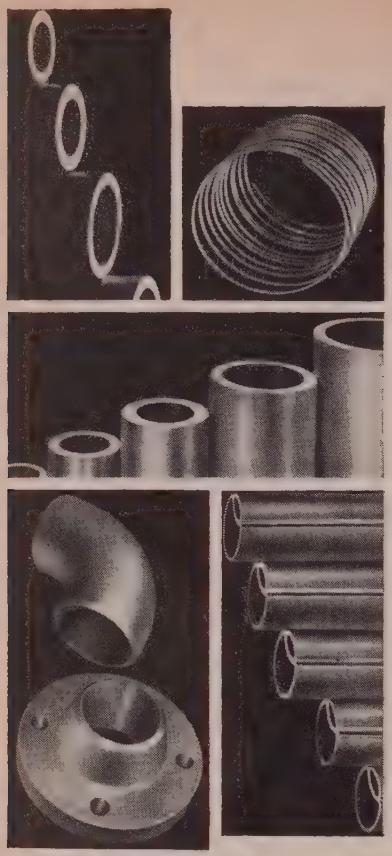

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New Casting Procedure Perfected for Titanium

SMALL titanium parts can now be cast in production quantities using permanent molds, according to Titanium Metals Corp. of America, New York, who made the announcement following completion of a two year research program. The casting procedure, called Impel Casting, promises to reduce mold costs which must be included in the price of such parts as pump housings, impellers, valve bodies fittings and pump sleeves.

To date, titanium has been cast in graphite molds, with production of parts limited to about 10 or 12 per die on some occasions, more often one part per die. Die costs thus have made the price of titanium castings impractical for most applications where castings are normally employed.

Accordingly, cast aluminum parts have had a negligible effect on the titanium market. By comparison, castings are a major force in the rest of the nonferrous metals industry, providing about 19% of aluminum shipments, 23% of magnesium and 88% of wrought zinc shapes.

40 Castings Per Mold

In work completed to date, TMCA has produced 40 castings per mold, believes at least 100 per mold probable. The first commercial order accepted by TMCA — for a 12-pound impeller — showed that mold costs could be absorbed and shipment completed of just nine impellers at prices lower than charged for titanium welded assemblies now in use.

■ *Nine-inch titanium impeller made by new permanent mold casting process.*

TMCA's present equipment limits production of castings to 12 pounds with maximum boundaries of 5 x 10 x 24 inches. A nine-inch impeller (pictured) was produced by the new procedure.

Because TMCA is gearing its current activity toward development of chemical process applications, the company is casting unalloyed grades of metal where corrosion resistance is more important than extremely high strengths. Titanium is virtually immune to corrosion in environments such as wet chlorine, nitric acid, hypochlorites, urea, inhibited sulfuric acid.

This concession is not as critical as it would appear since great strengths can be developed even in unalloyed grades. For example, yield strengths have been obtained in cast products ranging from 25,000 psi to 100,000 psi depending on which of the unalloyed grades was used.

Porosity appears to pose few problems. TMCA has yet to encounter surface porosity. The corrosion immunity of the metal thus will prevent attack in any area that might be subject to porosity.

The Impel Casting process relies on the excellent fluidity of titanium in production of high strength, accurate, intricate and stable parts. It requires a titanium electrode, double melted, with molten titanium "impelled" into the die cavity.

The shrinkage rate of titanium — 0.005 in./in. — makes timing a critical factor in feeding the metal into the die cavity and pulling the cores before titanium freezes to either or both. Timing is now automatic, but was done with a stop watch for the first year of research.

Have Pulled 12-Inch Cores

Core pulling is essential to casting of hollow parts. With titanium, 12-inch cores — about the size pulled from a cast automobile engine block — have been pulled successfully.

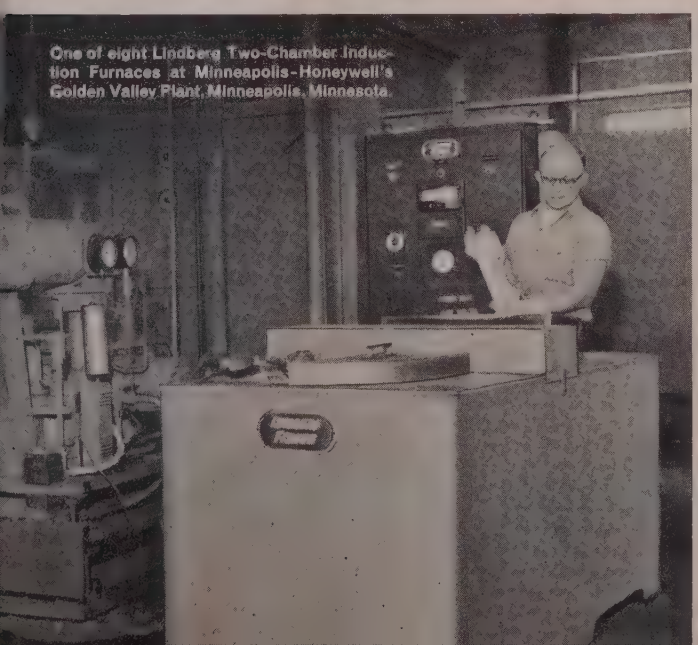
Use of permanent molds is a major advance over titanium casting completed to date. All development activity has been aimed toward use of graphite molds — either machined or rammed — employed in casting procedures similar to sand casting. In fact, titanium casting completed with this technique has reached the point where castings up to 148 pounds, with boundaries of 72 x 36 x 24 inches have been produced.

ART GEORGE has a good word to say for Lindberg Melting Furnace performance

Mr. Art George, Senior Production Engineer, Golden Valley Plant, Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.

"Our installation of eight* Lindberg-Fisher Two-Chamber Induction Melting and Holding Furnaces has given remarkable service for more than four years. In this period, with the help of a well executed Honeywell maintenance program, the installation has been unusually trouble-free. Only one of the eight furnaces has required relining over this long period. Handling more than 1,000,000 pounds of aluminum and zinc annually, the installation has unfailingly provided the consistently high quality of metal our precision instruments require."

**Altogether, 44 Lindberg Furnaces are in operation in various Honeywell plants.*



One of eight Lindberg Two-Chamber Induction Furnaces at Minneapolis-Honeywell's Golden Valley Plant, Minneapolis, Minnesota

These eight Lindberg-Fisher Induction Furnaces melt and hold aluminum and zinc for die casting gas valve housings and other component parts. They are located at the die casting machines where ingot and scrap can be melted and held at the desired casting temperature in one convenient unit. Magnetic fluxing and stirring insures uniform temperatures and consistently clean metal.

In any production process where aluminum needs heat there is Lindberg equipment to apply it most economically and efficiently. Furnaces for melting and holding, casting stations, re-melting or heat treating are available in all capacities, electric or fuel fired. Get in touch with your Lindberg Field Engineer (see your classified phone book) or write us direct. Lindberg-Fisher Division, Lindberg Engineering Company, 2446 West Hubbard St., Chicago 12, Illinois.

Los Angeles plant: 11937 S. Regentview Avenue, Downey, California. In Canada: Birlefco-Lindberg Ltd., 15 Pelham Ave., Toronto 9, Ont. Also, Lindberg plants in Argentina, Australia, England, France, Italy, Japan, South Africa, Spain, Switzerland and West Germany.

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Bridgeport

Vacuum Process Produces Super Purity Die Castings That Can Be Anodized

Intensive development program at Nelmor Mfg. Co. succeeds in producing super purity aluminum castings that can be color anodized. Uses seen in hardware, trim, optical goods, etc.

ALUMINUM die castings that can be polished, buffed and anodized to a lustrous finish rivaling that of chrome plate are now being produced by Nelmor Mfg. Co., Euclid 32, Ohio. The anodized finish can be dyed any color, and the castings can be welded or brazed.

This long-sought achievement in casting technology was realized by exploiting the unique properties of super purity aluminum, and by adapting a new vacuum feed method to the Reed Vacucast process. The 99.99% pure aluminum, called Lurium, is supplied by Fromson Orban Co., Inc., New York 16. The die casting machine is a Vacucast unit built by Reed-Prentice, East Longmeadow, Mass., a division of Package Machinery Co.

According to David Morgenstern, president of Nelmor, the Vacufeed system feeds clean metal to the die and replaces hand ladling.

Following a successful production run of die cast eyeglass frames, Nelmor has tooled up for a line of anodized marine hardware. Dies are now being made to cast radar waveguide parts which must be assembled by brazing. Morgenstern considers the process particularly good for producing appliance and automotive trim, building hardware, giftware, jewelry, photographic and optical goods, and lighting equipment requiring high reflectivity.

The Vacucast machine at Nelmor is a 400-ton unit with 36 x 38-inch die space. "The largest casting we have made on this machine so far is a near-rectangular shape measuring 10 x 18 inches and having an average wall thickness of 3/16-inch, with 3/8-inch thick ribs running across the face of the part," Morgenstern reports. "We have made production runs at rates of 175 shots per hour with a 2¼-pound shot."

Hood Encloses Platens

In the Reed Vacucast setup, a 2-part hood surrounds both the fixed and movable platens of the machine (see drawing on page 62). This hood is connected to a vacuum accumulator that has several times the volume of the die area to be evacuated. The casting cycle at Nelmor is as follows:

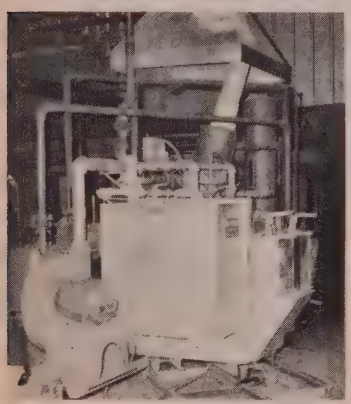
Start button is depressed and movable platen closes to within ¼-inch of final close, at which point the flexible hood seal completely encloses the die platens. The large diaphragm valve between the hood and the vacuum accumulator then snaps open, causing an instantaneous evacuation of air from the die and the injection chamber. Since the die is still slightly open, there is no possibility of air being trapped in thin wall areas.

The machine then locks, and the vacuum created in the die and injection chamber permits external air pressure on the molten aluminum in the furnace to force metal up through the ceramic feed tube and into the chamber. A plug in the ejector part of the die prevents metal from entering the die prematurely. Metal feeding time is approximately one second.

The injection piston is retarded by a timer until the required amount of metal is siphoned into the chamber after which the shot is made. The hood seal is then released, the die is opened and the casting is removed.

To counteract any air leakage around the injection piston during metal feeding, a vacuum chamber is mounted around the injection chamber. And dissolved gases in the metal — as well as gases generated by lubricants on the hot die surface — are evacuated in the same manner as air in the die and the injection chamber.

After the start button is depressed the entire casting cycle is automatically controlled by timers and limit switches. The casting rate is usually faster than a conventional die casting cycle — main



■ *Three views of vacuum die casting operation at Nelmor Manufacturing show: At left, special 3-compartment furnace that melts, degasses and holds metal, which is then automatically siphoned into injection chamber of die casting machine. Center, closeup of machine, showing Vacucast hood open position. Right, vacuum pump and accumulator.*

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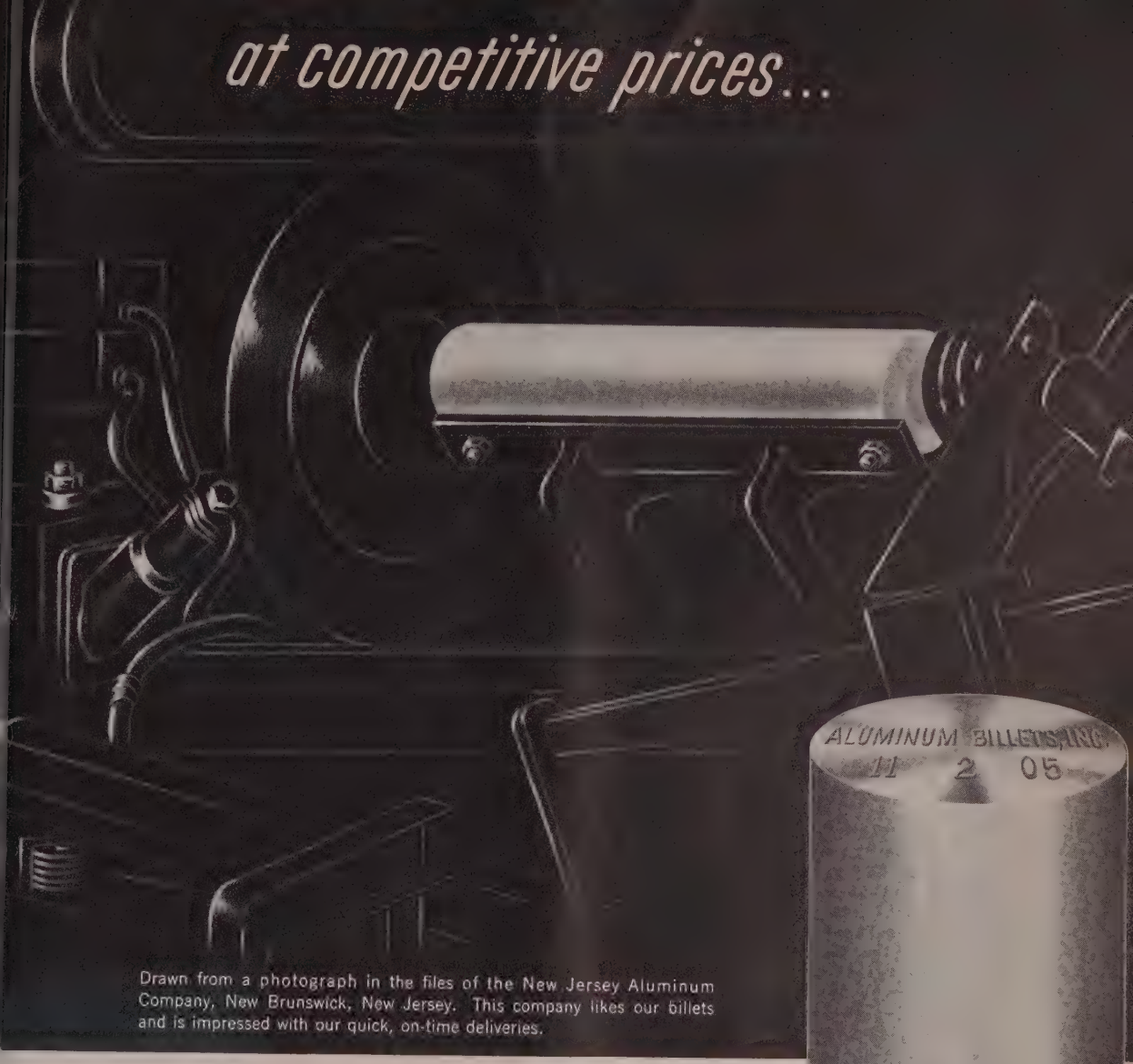

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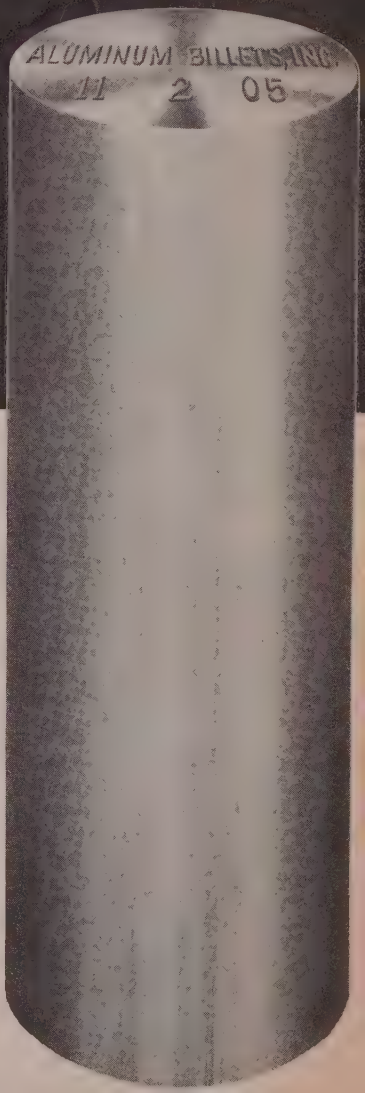

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because there is no entrapped blanket of compressed air to hinder the transfer of heat from the molten metal to the die.

Nelmor uses standard die casting dies, and the hood system permits the use of hydraulic core pulls. The hood also serves as a safety measure, since any spitting of metal during injection is completely contained.

Morgenstern found that vacuum casting requires great care in melting, holding and feeding of metal. "The metal must be well degassed, and the furnace equipment must be of a type that will create the least amount of oxide," he explains.

The furnace at Nelmor is a 3-compartment unit, heated by a gas infrared system to prevent turbulence on the metal surface. Fire brick barriers between compartments prevent carryover of any surface oxides from one compartment to the next. Gas chlorination of the melt is accomplished in the holding chamber. The ceramic feed tube of the die casting machine is immersed in the third well of the furnace, well below the surface so that clean metal without surface oxide will be drawn into the injection chamber.

To Prevent Die Soldering . . .

"We have found that with this equipment it is quite practical to cast the super purity Lurium alloys," Morgenstern reports. "Die soldering can create a problem, but this can be licked by proper gating of dies and contouring of runners.

"Since there is practically no heat loss through the feed tube system during siphoning of metal into the injection chamber, we can cast any alloy that is not excessively hot short. In addition to the Lurium alloys, we have cast high purity aluminum and the aluminum-zinc-magnesium alloys. We have also cast 7075 and 6463, but hot shortness is a problem with these alloys. Fluidity is no problem with this equipment because metal temperatures are so well controlled."

Anodizing Considerations

For general purpose castings that are to be anodized, Nelmor uses an aluminum-zinc alloy with low silicon and iron content. It has a tensile strength of 20,000 psi, yield strength of 10,000 psi, and elongation of 12% after ageing.

"For extremely bright anodizing, the super purity aluminum must be used," Morgenstern adds. "Zinc can be used as an alloying agent to enhance the strength of the castings, but it decreases the luster proportionately."

Nelmor takes great care in polishing and buffing of castings that are to be anodized. "The polishing compound must be iron-free, and we have to be extremely careful about cleaning the castings before anodizing," Morgenstern explains.

"The anodizing cycle has to be carefully controlled, especially in the brightening stage, to minimize etching. W also have to be very careful in neutra izing the anodized part before it go into the color tank in order to preve bleed-out of colors.

"We have found the satin finish most satisfactory. They are the most a tractive to the eye and are the easiest t control as to uniformity," Morgenster adds. "We have also found that th super-purity die castings are amenabl to porcelain enameling."

Morgenstern and his associates in th venture decided on the Vacufeed syste only after trying all available vacuu casting methods. "We found them a inadequate for our purposes becaus they evacuate the die cavity only. W found that air leakage into the cavit would cause oxide streaks in the cas ing, and this made it impossible to ge an acceptable anodized finish," he point out.

Casting Rate Up 25-50%

"With the installation as it no stands, we get an extremely porous-fre casting with a degree of density that w had considered impossible. What's more we find that the Vacufeed system boost casting rates anywhere from 25 to 5 per cent, compared with hand ladling.

Morgenstern says the Vacufeed sy tem is available to other die casters by payment of a nominal licensing fe for conversion of conventional equip ment, or by purchase of new machine incorporating the system.

WHAT'S NEEDED
to make vacuum die casting work properly

A leading authority discusses factors that can 'make or break' success of a vacuum installation.

by Earle Rearwin, Chief Die Casting Engineer, Reed-Prentice Div. of Package Machinery Co., East Longmeadow, Mass.

THERE is no longer any doubt about the benefits obtained by the proper application of vacuum to the die casting process. However, there are many die casters who have not recognized this fact.

Much of this failure to recognize the benefits of vacuum die casting may be attributed to the fact that many of the vital elements of vacuum casting are overlooked or ignored. There are many so-called vacuum installations on die casting machines that serve little or no purpose. Still, the die caster insists that he has a vacuum installation.

The results obtained from the application of vacuum to the die casting machine are directly related to the duration of such application. This basic fact is disregarded by the majority of die casters who have applied vacuum to their casting operations.

The vacuum, to be useful, must be applied on the cavity during the entire casting cycle. We have instrumented all types of vacuum die casting applications. Many types applied to a variety of dies actually showed greater back pressure in the cavity than the same cavity would show under the usual die casting method, using vents alone.

It Can Be Deceptive

It is hard for the operator or engineer to realize this when he looks up at the Bourdon type gauge and it shows 28 inches of vacuum just before he pushes the shot button. He assumes that he has 28 inches of vacuum all the time the shot is made and the cavity fills

Instruments have proved that such i not the case. Actually, he may end up having pressure in his cavity equal to his injection pressure for 75 or 80% of the cavity fill time. This causes voids and porosity. Most times these voids and this porosity are greater than they would have been with usual injection methods using a vented die.

An analogy that is easily understood would be that of filling a vessel from the bottom. This vessel has an opening in the top. If you leave the top opening clear to the atmosphere, the vessel fills easily. If you apply vacuum to the top opening it fills still faster and easier But if, during filling, you close the opening on top, the filling stops and pressure develops in the unfilled portion

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of the vessel equal to the filling pressure. An unfilled pressure void is the result.

Instruments Tell the Story

We have instrumented these vacuum applications to dies by the use of strain gauges on ejector pins, and by the use of water cooled capillary ejector pins. These in turn, are coupled to transducers. When instrumenting dies in which a shutoff valve in the die is part of the system, we place a sensing transducer on the valve. This makes it possible to secure a pattern showing the entry of molten metal, the closeoff of the vacuum valve, and the buildup of pressure after the valve closes.

Our transducer on the cavity pressure capillary pin was calibrated to 3000 psi plus, and 32" minus. In several cases we have exceeded the range of the transducer; that is, we have gone over the 3000 psi back pressure. This while we supposed we had a vacuum in the cavity.

We found that when these valves were air operated and solenoid controlled using a-c current, the back pressure varied greatly from shot to shot. In some cases, the back pressure exceeded 3000 psi; in other shots, it held close to 0. We noted that back pressure was directly related to the closeoff time of the valve in relation to metal entry. This must be timed in milliseconds.

When dies were equipped with the hydraulic balanced circuit, the results were much more uniform. The plunger and metal temperature did affect the hydraulic balanced pressure and the timing of the closure. However, we had no difference due to the variation or the air pressure fluctuation.

We found that the closing of these valves is very critical. If closed too fast, especially with air, they will hit and bounce open. Hydraulic closing of these valves was uniform and was much better when using Bellville washers for counter balance.

We instrumented the old thermal block method and found that we got back pressure only when the venting to the block was improper; that is, when the metal hit the vents and blocked them before the cavity was filled.

By holding shots from filling—that is, by preset blocks—we found that the loss of vacuum through ejector pins and parting line was faster than filling of the cavity. We would lose 80% of our indicated vacuum in about 200 milliseconds—this on a die with eleven ejector pins fitted to close working tolerance. We could not determine what portion of the vacuum was actually lost through the parting line, and what portion through the pins.

We were not wholly successful in sealing off the pins without enclosing the entire ejector box. Parting line of die was not sealed off except for certain test conditions when we used a calking seal on the die surface.

We found that the practice of leading all cavities into a common collecting runner was the cause of much back fill and misrun in some cavities. This was determined by placing trace material on the outlet of a cavity. We found the material within the cavity in some cavities, and in the common runner on others. It was concluded that each cavity needs to have its own individual vent.

On dies for casting aluminum, we found that a great deal of air at hig velocity entered the cold chamb around the plunger. This caused a hig froth on the metal in the cold chamb The result was high oxide content the metal and porosity in the castin This made machining of the casti difficult.

We built a complete enclosu around the die, making sure that t die was under a complete vacuum at t time the shot was made and that t vacuum continued after solidificatio Normal gating and venting was use

The Villain: Plunger Leaks

The instruments still indicated a lar variation in vacuum conditions at t time of the shot. We had no back pr sure, but the vacuum drop was variab This vacuum drop was traced to t leakage around the plunger. The va able was due to a difference in t sealing effect of the plunger lubrica

The cold chamber was then co pletely sealed from any outside leak, and metered amounts of plung lubricant were injected using a block valve. The instruments then indicat a very small drop and the drop was t same for each shot and for each con tion of temperature and of plunger brication.

Using the complete instrumentatio we made production runs of 1000 1500 shots per series. The variati was less than 2½% on each scale. Visu and X-ray examination indicated ca ings of high quality, low porosity a good surface condition. Quality v uniform for each condition. This exa ination included subjecting castings various degrees of elevated tempe tures.

During the entire experimentati the effects of gas and oxides in casting metal were observed. We fou that aluminum containing gas g greater porosity when cast under v uum than when cast without vacu

As a result of this work, the foll ing conclusions have been reached:

1. Vacuum, in order to be effecti must be present in the cavity dur the entire casting cycle.

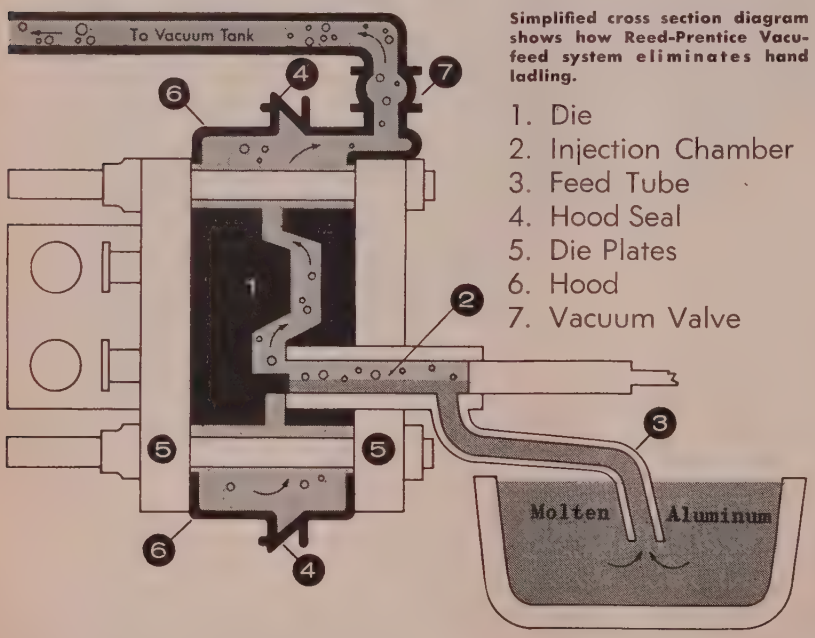
2. Vacuum, in order to be fully ef tive, must never allow a back press to develop.

3. Venting, even under vacuum, m be independent for each cavity.

4. Metal, when cast under vacu must be free of gas and oxides. T proved to be extremely important.

5. The timing of the vacuum ap cation is of utmost importance, and effective increments of time are m seconds.

6. In order to be effective and eli nate destructive variables, the en die area must be sealed during the



Simplified cross section diagram shows how Reed-Prentice Vacu-feed system eliminates hand ladling.

1. Die
2. Injection Chamber
3. Feed Tube
4. Hood Seal
5. Die Plates
6. Hood
7. Vacuum Valve

on cycle. With aluminum, this also udes the cold chamber area.

In order to completely eliminate ables the connected vacuum reser- or accumulator must be at least times the volume of the cavity and t be connected so that the cavity vent vacuum and the reservoir vac- n remain nearly constant during the re casting cycle.

The gate velocities were increased er sustained vacuum using the same nger pressure, and the cavity filling es were decreased. It was observed the filling pattern also changed. clusive tables were not developed. h a completely enclosed and bal- ed system the vacuum value was lied. We found that there was no gnizable difference in results ob- ed in the vacuum ranges over 18 es. Under 16 inches of vacuum we an to show porosity; under 12 inches began to show a different surface dition.

When operating under 16 inches acuum we found that application of die release material became critical. vacuum was not powerful enough emove excess material when applied. 0. The orifice (gate) conformation ery critical when operating under uum. This should have been appar- to us. The flow pattern from any ce into a vacuum differs from the pattern from the same orifice nst the pressure of one atmosphere nultiple atmospheres caused by back sure. We found that this flow pat- is very important when casting the fluid alloys and the alloys with a ow solidification range.

tal Behavior Differs

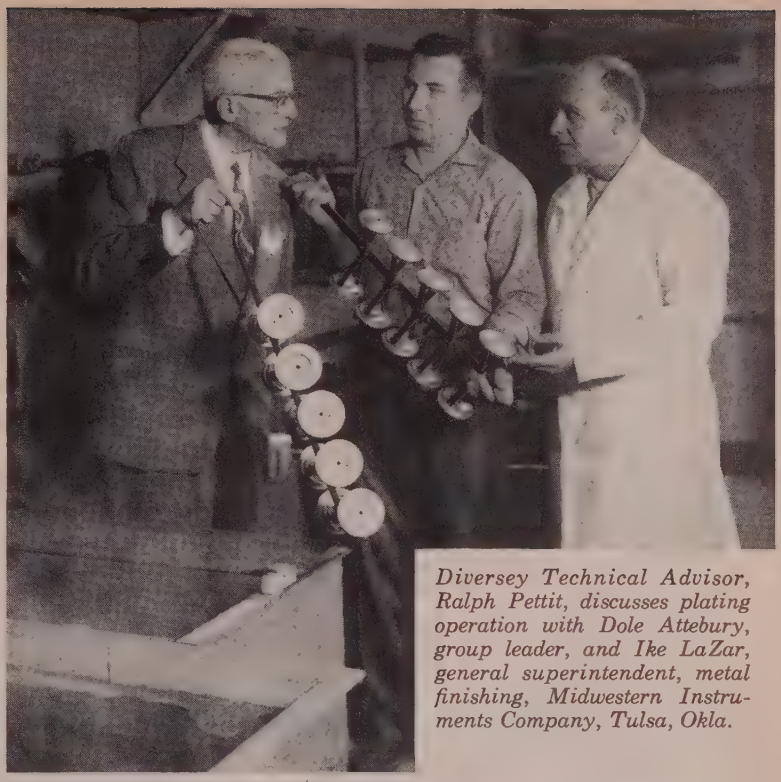
veral observations were made from ch no conclusions have been reached. example, the metal action in the chamber differs under vacuum; it ls to climb both the side walls and ends.

he thermal action of the metal also ears to differ, especially in tubes metal passage areas. This causes ze-offs and erosion.

he final conclusion: Do not attempt beat time" by the mere application acuum in the near vicinity of your ng cavity. Instrumentation proves vacuum must be present during entire casting cycle without any vari- n in order to accomplish consistent efits.

hen using vacuum for ladling only, must be taken to avoid the crea- of variable conditions, or condi- s leading to the development of pressure within the cavity.

are must be taken to avoid creation xides in the metal or expansion of in the metal.



Diversey Technical Advisor, Ralph Pettit, discusses plating operation with Dole Attebury, group leader, and Ike LaZar, general superintendent, metal finishing, Midwestern Instruments Company, Tulsa, Okla.

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Low Pressure Casting Process Produces Integral Wheel-Brake Drum Assembly

Progressive solidification inherent in the low pressure permanent mold casting technique at Kelsey-Hayes Co. produces nonporous wheel hub and drum with cast-in iron liner. The method gives the highest yield from metal poured.

by F. H. LeJeune, Plant Engineer, Kelsey-Hayes Co., Jackson, Mich.

ALUMINUM automotive wheels and brake drums have been used to some extent in the past. Kelsey-Hayes Co. has conducted extensive tests on both aluminum brake drums and aluminum integral hub and drum assemblies. Best results have been obtained from a composite brake drum consisting of a cast iron liner, cast into an aluminum brake drum or integral hub and drum casting, and bonded to it by the Al-fin method.

The Al-fin method consists of submerging the iron liner in a 1400° F bath of 99.5% aluminum until an iron-aluminum alloy of .0008 to .001 inches thick is formed on the surface of the iron. The iron liner is removed from the aluminum bath after the correct time exposure and quickly placed in the mold. The mold is closed, then filled with the required aluminum alloy at about 1400° F temperature.

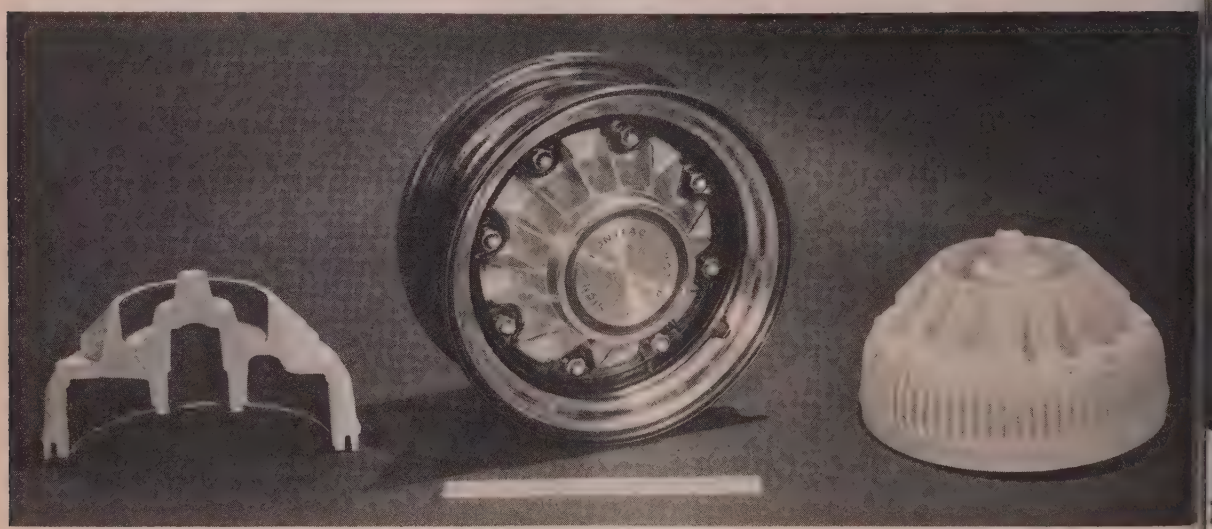
With good controls, this procedure produces a good metallurgical bond between the iron and the aluminum alloy. This is advantageous in transmitting heat from the braking surface of the iron liner to the aluminum casting when the brake drum is in service.

In 1958, Kelsey-Hayes management authorized an experimental program for the development of the best method of casting the composite brake drums and integral hub and drum assemblies. Permanent mold casting was chosen as the best method, considering the parts we were going to make. Gravity casting in permanent molds is the most common method but was objectionable from the standpoint of the excessive risers and gates needed to cast some parts. Centrifugal casting was tried out but not considered satisfactory when used in conjunction with the Al-fin bond.

An experimental furnace and mold operating machine were constructed to cast parts by the low pressure method, in which the mold admits molten metal from the bottom, with a very short sprue and, in this case, no risers. Th method was chosen because it woul give the highest yield of metal poure of any of the permanent mold method Also, castings made by this method hav uniform density and no porosity. Ma imum remelt is less than 5% of th metal in the casting.

The low pressure mold is sealed t the top of an air-tight holding furna containing molten aluminum alloy. tube is sealed to the bottom openin of the mold and extended downwar into the molten aluminum, nearly t the bottom of the furnace.

A cast iron liner, which has bee submerged in the bonding furnace f the correct time exposure, is placed c locating pins in the drum mold, th mold is closed, and regulated air pre sure is admitted to the furnace on tc of the molten aluminum. Thus, molte aluminum is forced up the tube ar into the mold by this pressure, whi is maintained just long enough for th metal to solidify in the mold as f



■ *From the low pressure permanent mold casting process used by Kelsey-Hayes come nonporous integral front hub and drum assemblies. At left, one of these castings is shown in section; the finished unit is shown in the center. At right, it is sho as it leaves the foundry. The process generates a minim of scrap; produces aluminum castings of uniform density.*

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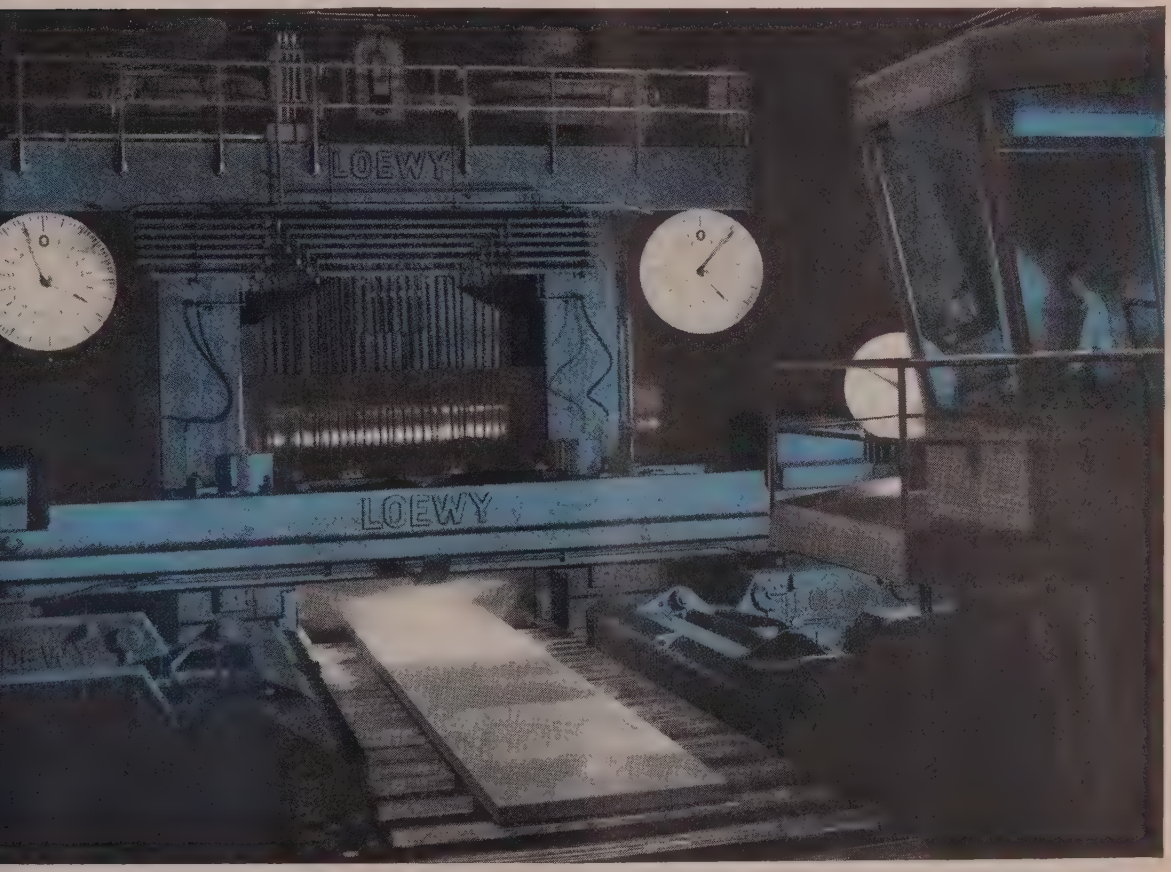

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Above, left, the operator is removing a cast iron liner from the fixture hook of t bonding furnace before inserting it in the permanent mold for the casting operatio At right, the operator in foreground is waiting for the finished integral casting to ejected from top mold. Man in background is operating the mold opening valv

as the sprue. Pressure is then released and the molten metal in the tube returns to the furnace by gravity.

By maintaining pressure on the molten aluminum during solidification, molten metal replaces any loss of volume due to shrinkage during solidification.

Considerable development work was required to insure progressive solidification of the metal from the extremities of the mold to the sprue. Also, special precaution had to be taken to insure that the iron liner was located exactly central in the aluminum casting. An off-center liner in a composite brake drum may cause poor brake performance.

For Pontiac and Lincoln

After the initial experimental period, equipment for a pilot foundry was installed and production was started. At present, Pontiac heavy duty front drums, Pontiac integral front and rear hub and drum assemblies, and Lincoln front drums are being cast by the low pressure method in production quantities. Rigid controls are maintained on the product at all times.

The 356 aluminum alloy is held at uniform temperature and to specification at all times. Test bars are constantly checked for physical and chemical specifications. Dimensional checks and tests for concentricity of the liner and completeness of the Al-fin bond are part of rigid controls maintained.

There are various ways to arrange low pressure casting furnaces, according to the production required and parts to be made. The arrangement best suited to Kelsey-Hayes' present program was laid out with four Aja Magnethermic induction casting fu naces of 1600-pound capacity set at t corners of a square operating floor. T 600-pound Lindberg electric resistan type bonding furnaces are position at opposite sides of the floor, ea between two of the casting furna which they serve.

Two Lindberg 1000-pound capac tilting gas melting furnaces occupy t other two sides of the floor, oppos each other and between two casti furnaces which they serve.

Molten aluminum is laundered, wh required, from the tilting melters rectly into the air-tight casting f naces. Since each casting furnace ho 1000 pounds of usable metal, the me ing furnaces have plenty of time melt metal for two casting furnaces

The bonding furnaces are equipp with a rotating fixture which has thi hooks on which cast iron liners can suspended in the 99.5 aluminum the required time for bonding. As t carryout of metal is small from t bonding furnace, additions are ma by means of small ingots.

Accent on Clean Metal

No hot metal is ladled in the partment. All casting alloy is degas in the melting furnace before laund ing into the casting furnaces.

Kelsey-Hayes has taken all possi precautions to maintain dross free, h quality, uniform temperature me The only secondary metal used is fr the small sprues from each casting, a the rejects from Kelsey-Hayes' own c ing furnaces.

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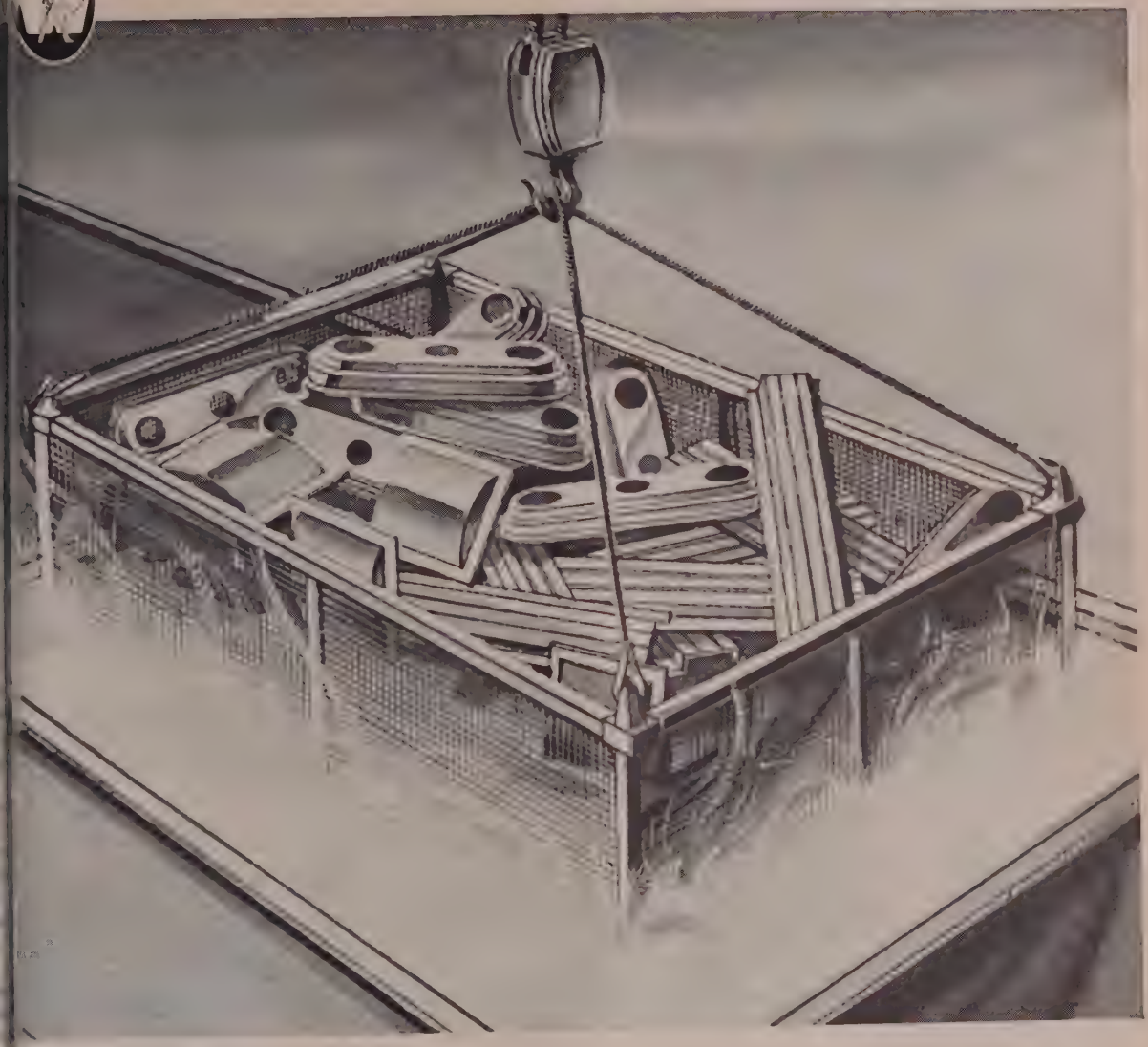

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How Small Castings, Big Sheets Are Painted Quickly, Efficiently, Inexpensively

Chicago firm has electrostatic equipment for painting fabricated parts; a line for roll coating sheet from which products can be made. Both sides of this two-fold operation are expected to prosper as customers develop new products and coating materials continue to improve.

by K. B. Rhodie, Associate Editor

FIVE workers paint 8,000 aluminum die castings for household mixers in a day, and they keep rejects below 1% and use 60% less paint than a conventional hand spray system would use. The secret: The No. 2 electrostatic painting process used at Enameled Steel & Sign Co., Chicago.

This is now a routine task for Enameled Steel, but one unheard of 60 years ago when the company, then a sign maker, started operations. However, in its quest for more appealing eye-catchers, the firm gained enviable experience as a coater of metals; stopped making signs during World War II, and concentrated its efforts on finishing metals efficiently, cheaply, quickly.

Now, Enameled Steel has 13 complete electrostatic spray systems, some designed to handle small parts such as castings and stampings, others for products such as flat perforated or embossed sheet ranging up to 20 feet long by 4 feet wide. And the firm can roller-coat alkyd, epoxy, acrylic, organisol, vinyl and embossed plastisol coatings on aluminum and steel coils up to 22 inches wide.

Also housed in the three-story building on Chicago's northwest side are facilities for dip-coating large and small parts and for silk screen printing. Rick Smith, the firm's sales manager, says these facilities make Enameled Steel a complete job shop painter, geared for high-volume production.

Precoating; Part Painting

"Fabricators whose products are most economically manufactured from precoated sheet can have Enameled Steel apply any of a variety of finishes with our roll coater," Smith says, "and for those fabricators who must paint after manufacture, we have electrostatic equipment."

The service is completed by the silk screening department which can print words or designs on appliance trim, hi-fi sets, etc. (see photo on page 72).

In 1946, Enameled Steel became interested in electrostatic painting, was an early licensee of the No. 1 process.

"A lot of success was experienced with this system," Smith points out, "but the company found it somewhat difficult to paint smaller parts. So, our engineers, working with the Ransburg Electrostatic Corp. in Indianapolis, developed the loop and disc method of application."

The No. 1 process was devised to help minimize paint loss, which is high with conventional spraying. An ordinary air pressure spray gun is used but an electrostatic field is created in which the work takes one polarity (i. e. negative), the paint spray another (positive).

As the fine spray spews forth from the gun the poles attract and almost all the paint finds its way to the metal product. And even that paint which shoots past the metal's edge wraps around and adheres to its back.

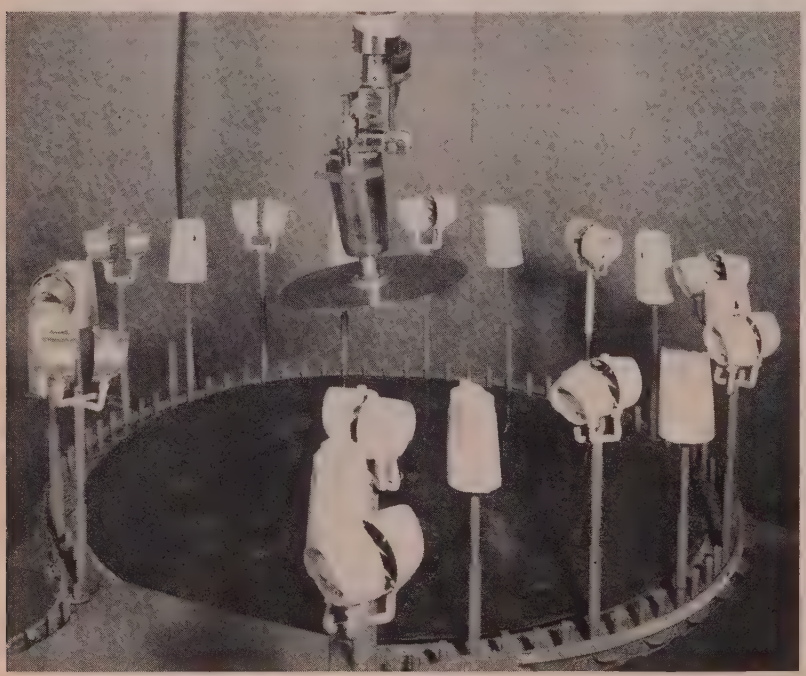
The No. 2 process uses the principle of magnetic attraction—the electrostatic field—but does not use air or spray guns. Instead, the paint is pumped slowly onto a spinning disc or bell-shaped head. Centrifugal force causes the paint to work toward the edge of the rotating head where the electrostatic field atomizes the paint and conducts the mist to the oppositely-charged work.

The Loop and Disc System

Enameled Steel uses this No. 2 process in loop and disc and flat bed paint application systems. In the former, the spray head hangs down in the center of a loop formed by a conveyor. As work travels along the conveyor the spinning head gives off its paint mist which is attracted to the work. The work then travels on to a baking oven.

In flat bed painting, the work travels a straight path beneath a disc which not only spins but reciprocates horizontally so that extra wide work is painted thoroughly.

The loop and disc system has two



■ *Dormeyer housings are electrostatically sprayed on loop and disc system. Paint is pumped through hose (top of photo) to underside of spinning disc.*

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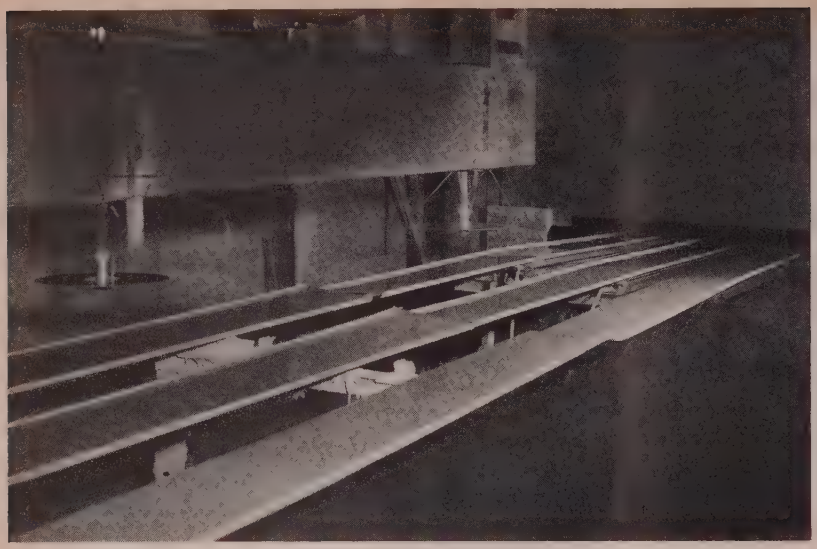


■ *Residential siding is being painted on electrostatic flat-bed system. Two coats are applied by using two spinning discs. The disc at the left (above) applies the cover coat which fills any pores or slight imperfections, while the disc to the right applies the final finish coat. At far right siding enters baking oven. The boom on which the two discs are mounted reciprocates horizontally to give the three strips of siding full coats of paints. Enameled Steel says this is perfect coating method for embossed sheet, since magnetic field conducts paint to "hills and valleys" of surface, as well as around cut edges of holes as in perforated sheet.*

variations—spindle and overhead. In the spindle method, parts are placed on slowly rotating jigs positioned on a waist-high conveyor. They slowly turn the product, insuring proper paint coverage.

The overhead system is the same except that parts hang from a ceiling conveyor. A reciprocating head is used, but it has a steady up-down movement for painting extra long parts.

Varied Equipment Built

To electrostatically paint parts of various shapes and sizes, Enameled Steel has devised a correspondingly varied collection of equipment.

First, there are nine complete spindle-type finishing set-ups, each of which has at least two loop and disc stations and a baking oven, and paint heads which can be held stationary or set to reciprocate vertically. The spindle units are ideal for painting large volumes of die castings, small stampings, swaged and welded tubes, and small welded assemblies.

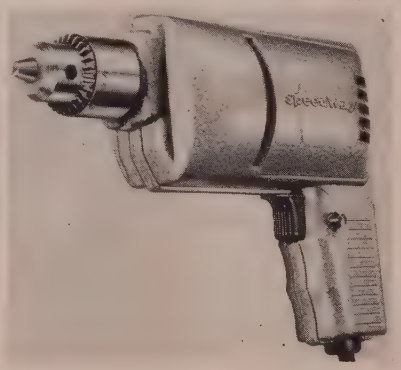
There are also two overhead conveyor machines on which parts up to six feet long can be run. One of the overhead units consists of a 3-stage spray cleaner, four loop and disc systems, and a gas-fired refractory-burner baking oven.

Parts painted on this overhead unit are first placed on a conveyor which dips down at the loading point, then takes parts to the U-shaped cleaning machine which is 35 feet long, 9 feet high and 5 feet wide. Here the work is washed with thermostatically controlled solutions, given a phosphate etch, then dried at 350°F.

The conveyor then takes the parts along an S-shaped path, weaving between two reciprocating paint discs. This allows both the front and back of the parts to be given an equal paint coating. Next, parts go through a touch-up line where areas inaccessible to the disc's mist are sprayed with an electrostatic hand gun. The line then makes another S-shaped trip around two more reciprocating discs which apply a second and heavier paint coat, or possibly a clear topcoat.

Coated parts then enter the 50-foot baking oven. The conveyor makes a U-shaped loop inside the oven and as parts emerge they turn off at a right angle and go to an unloading station.

The other overhead machine is similar, but parts to be painted are treated



■ *This power drill has a die-cast aluminum housing. Note textured finish applied by electrostatic spray. Method can apply matte, stipple or scratch surface.*

and etched in a separate cleaning machine. By separating the cleaning and painting operations, the shop can accumulate large amounts of work, and can prepare them for painting at one time at a faster rate.

Enameled Steel also has two flat bed conveyor machines which enable panels up to 20 feet long to be electrostatically painted. Discs reciprocate horizontally above and below the work so panels can be painted on both sides simultaneously.

The flat bed conveyor has several advantages says Rick Smith. Loading and unloading can be done quickly; various sized parts can be handled, and painting relatively flat work in a horizontal position permits the use of slower solvents and makes it easy to obtain a smooth uniform finish.

Now that we've examined the various types of equipment Enameled Steel has built in its plant, we can see how some of it actually operates. Specifically, we will trace the two-piece motor housing of the Dormeyer Mix-Maid electric household mixer as it is cleaned, pre-heated, electrostatically-painted, cured and cooled.

First Inspection; Then . . .

These aluminum die castings are made by Dormeyer and received at Enameled Steel already polished and machined. Dormeyer inspectors come to the finisher's plant and check each piece to be sure that there are no flaws which would show up after finishing and that all taps are in place, burrs removed, etc.

From the inspection lines the parts move to the phosphate coaters. For aluminum, these are 3-stage flat-bed washers about 18 feet long. Each stage is 6 feet, the first two containing 50 spray nozzles aimed so solution hits the parts being conveyed through the tank from the top, bottom and both sides.

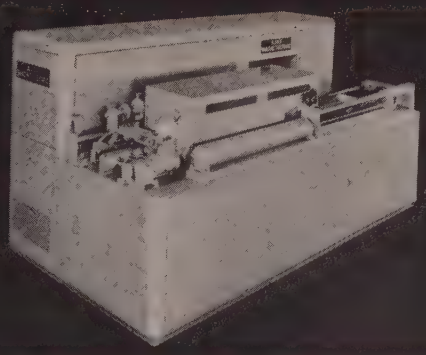
A mixer component travels through the first washing stage for 1 minute, during which time it is sprayed with a solution of No. 89 crystal coat and No. 33 booster acid supplied by Oakite Products Inc., New York. This first stage cleans the metal and gives it a slight etch.

The casting then goes into the second stage where it is sprayed with Oakite No. 33 acid which gives the piece its final deep etch. Temperature of the solutions in the first two stages is kept at 120°F.

Next, parts are rinsed in fresh clear water kept at 130°F. Here, the parts are immersed in the water, which is fed continuously from the bottom. Scum from the many pieces passing through the tank forms on the surface and skims itself off into an overflow. Rinsing time is also 1 minute.

(*Continued on page 72*)

TAPER HEATING... ONE OF MANY WAYS BILLET HEATING BY INDUCTION INCREASES PRODUCTION OF EXTRUSIONS



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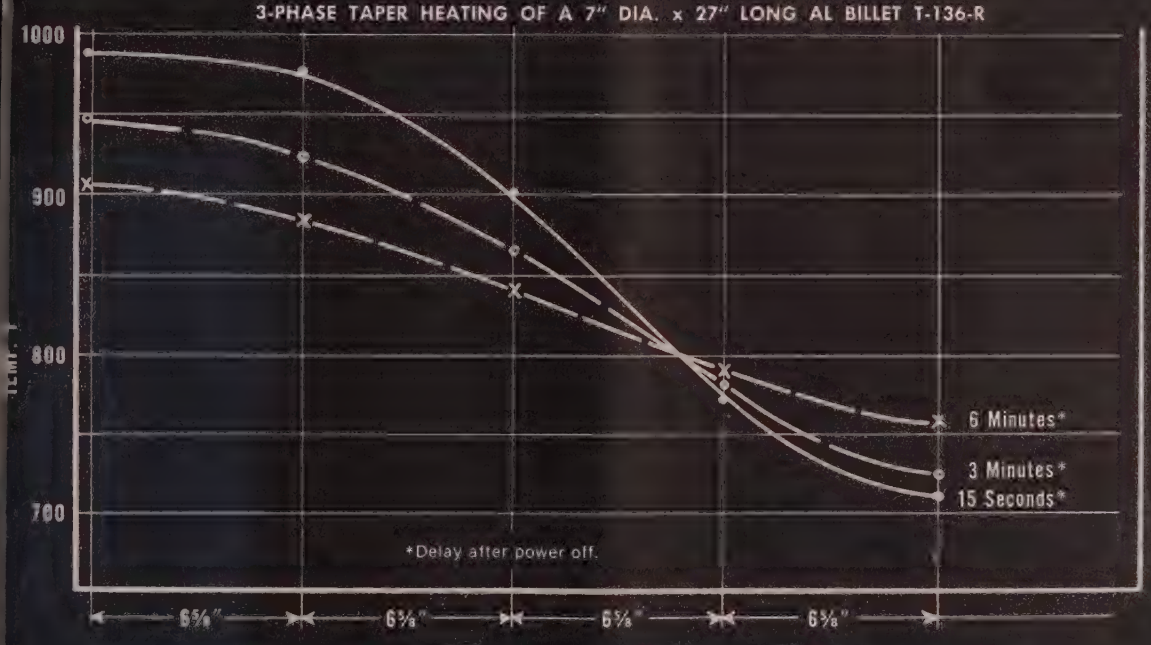
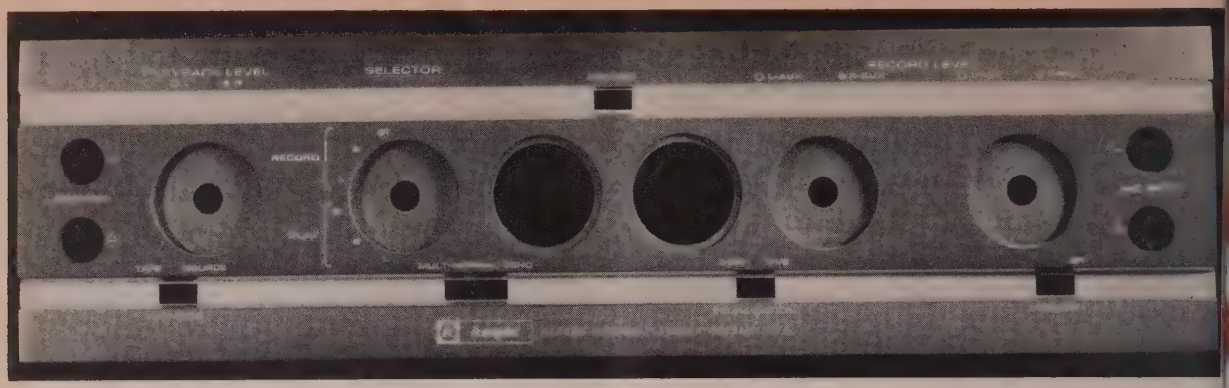


Here is the result of an actual test performed in our Youngstown Laboratory. Purpose — To demonstrate that the Tapered Pattern within an aluminum billet diminishes only slightly after power off.



■ *This hi-fi control panel is a good example of Enameled Steel's versatility. It was received with outer edges gold anodized, but company had to roll coat a brown strip down the middle two white strips, then silk-screen print words and name.*

The castings then go through a gas-fired dry-off oven which heats the parts at 200°F; pieces are then cooled at room temperature. After these operations are complete, one more step is necessary in painting die castings. They are pre-heated so that all entrapped gases are released, then cooled. This insures a smooth painted surface which will never blister.

Castings are then painted using the Ransburg No. 2 process; loop and reciprocating disc method with spindle-type jigs. Front and rear housing are painted together to insure color uniformity; are given two coats of white baking enamel which is built up to 1 mil thickness. Colors can also be applied; some units are painted pink, yellow or turquoise.

Parts are jigged, then started through the paint line. The first disc applies a thin coat of enamel to fill slight pores and give the casting a more uniform surface. The second disc, which is 6 inches in diameter and rotates at 3500 rpm, spins a thicker, final coat onto the part.

From the paint line the pieces go directly into an infra-red baking oven. It takes 7 minutes for a part to travel past the heating elements which keep the temperature at from 325 to 350°F.

Unjigged and Cooled

As parts come out of the oven they are removed from the jigs and placed on a conveyor passing in front of electric cooling fans. Cooled parts are then inspected and packed in cartons and further cured at room temperature for 10 to 12 hours before being shipped.

A crew of five can process 8,000 Dormeyer aluminum die castings a day by following the procedures outlined. This means 4,000 complete housings.

Ed Arrison, Enameled Steel's assistant plant superintendent, says that less than 1% of the parts processed for Dormeyer are rejected; that 60% less paint is needed since Dormeyer switched from hand spraying these components.

Now let's take a look at the other half of the firm's two-fold finishing operation—the roll coating line. It is 350 feet long and can apply coatings ranging from .0002-inch to .012-inch, to metal as thin as .006-inch or as thick as .048-inch. The line normally runs at 80 feet per minute, but this varies with the length of time the coatings must be baked after application.

At the head of the line is a monorail crane which loads coils onto an uncoiler. The metal is then threaded through an accumulator which builds up a reserve of coil so the line can continue running while a new coil is spliced to the tail of the coil already in the work.

Metal is prepared for painting in a six stage tower unit in which aluminum is cleaned, hot rinsed, conversion coated, cold rinsed with fresh running water, clear rinsed, chromate hot rinsed, and dried. If steel is being run, the conversion coating stage is shut off and a phosphatizing stage used. Squeegee rolls after each stage strip metal of solutions to avoid carryover.

Next, the metal is painted on a Gasway coater which has two sets of application rolls for finishing the face and the reverse side of the strip. Colors can be switched almost instantly here by a mechanism utilizing hydraulic cylinders which move rolls to the strip, or back them away quickly.

Painted coil is then baked in a 5-stage oven. The first stage, which is very important to uniform finishes, is set at the lowest temperature so the solvents are driven off gradually. The heat builds up in the second stage and goes still higher in the third stage where all solvents are exhausted.

At the fourth stage the oven reaches its peak of 700°F, and in the fifth the temperature drops slightly to prepare the metal for water spray cooling outside the oven. Drive rolls lay beyond the spray and take the metal to a point where it can be waxed, if necessary, to aid recoiling and subsequent metalworking operations.

An interesting application at Enameled Steel, and one which Smith says is the only operation of its type in the country, is when electrostatic and roller coating methods are combined to produce embossed plastisol coatings.

For this type of finish, strip is first electrostatically painted with a primer which provides a base for the plastisol coating to adhere to. After the primer is applied, the coil has a coat of plastisol rolled on.

After the plastisol is baked in the 5-stage oven the strip heads for embossing rolls which texture the coating. The rolls are set so they "float" with the strip as the embossing takes place, and are internally water cooled to shorten the dwell time and to freeze the pattern.

The line, except for the Gasway applicator, was built completely by Enameled Steel. It is 350 feet long, but strip actually travels over 550 feet since it must go through the three-story accumulator and metal preparation unit.

Precoat Finishes are Tough

Smith says that if careful attention is given to all facets of the coating operation, and if the proper coating is being used for a particular end product, the rolled coatings can be expected to withstand most fabricating operations, including bending, crimping, dove-tailing, drawing, hemming, notching, punching, roll forming, sawing, shearing, slitting, snipping, stamping and welding.

Of course, all of these processes have been applied in manufacturing the following from pre-coated sheet: Air conditioners, automotive parts, boat sections, bottle caps, business machine cabinets, cameras, luggage, toys, telephone parts, seats, furniture, venetian blind stock, etc.

Business at Enameled Steel is good but the firm thinks this is only a sign of greater things to come. In preparation for this, it is planning to build another roll coating line. Plant expansion is also being mulled over.

The company's president, Curtis Simmons, bases his optimistic look at the future on three factors. The first

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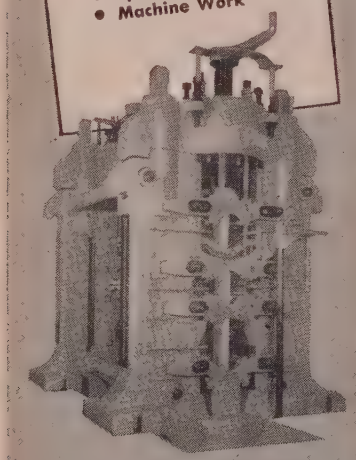

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is the firm's demonstrated ability to build and utilize its own equipment; second, its past success in converting manufacturers to the electrostatic or roll coat finishing of products.

The third important factor is the "tremendous assistance the coating manufacturers are giving us all by producing tenacious finishes that are attractive, durable and tough enough to withstand handling and fabricating procedures."

As already stated, Enameled Steel built almost its entire roll coating line. This, of course, includes the tower cleaning unit and the 50-foot oven. And it was Mr. Simmons himself who was instrumental in the perfection of the No. 2 electrostatic process which the Ransburg firm now builds for leasing.

Peter Spera, plant superintendent, says the company has its own laboratory in which it is continually researching and developing newer and better methods for the company to use in its shop. For instance, a unit for prime coating and baking coil prior to full roller coating has been perfected, and production equipment is being readied.

Enameled Steel has been able to convert customers to using electrostatic or roll coating methods because of the equipment's ability to handle numerous types and shapes of products, and to apply many different finishes.

But another reason, adds Spera, is that "we seek out information on the latest resins and raw materials, analyze it, and use it to our customers' best advantage. We think this enables product quality to be continually improved without the extra cost of duplicating such engineering effort in the customer's plant."

Spera was asked which phase of the operation—roll coating or electrostatic spraying—is expected to grow most rapidly.

"Actually, we expect both of these processes to prosper," he answered "because they each serve a particul purpose, and are both fast, economic require small work crews and ma maximum use of paint.

"But it is interesting," Spera co tinued, "to watch first hand the co troversy between pre-painting a painting a product after fabrication. course, this can only go on in certa areas since some products must painted after they are made. Cast iter are a good example.

"The contest between the two pr esses have so far been inconclusive. paint manufacturer made a survey few years back and found that electr static spraying used slightly more pai than roll coating, but the difference w really small.

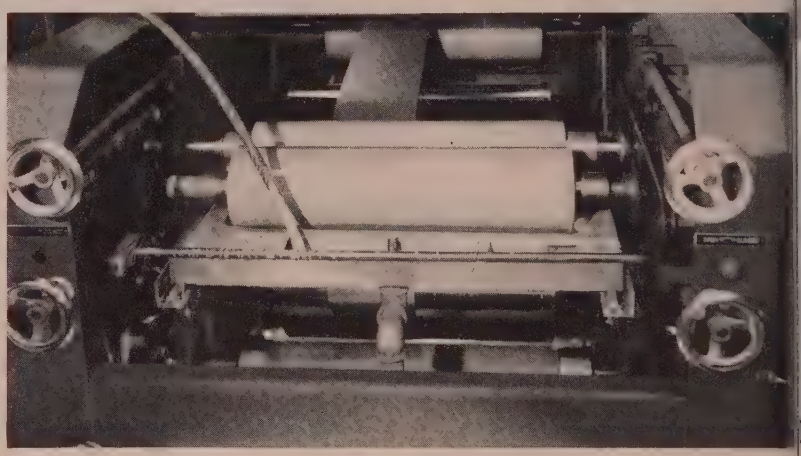
Consider Production Rate

"In fact, any saving here can usual be wiped out if the product being mac from pre-coated sheet must be fabr cated at a slower rate than if ba metal were used.

"For instance, one manufactur claims he can 'spit' out unpainte movie projector reels so fast—witho worry of scratching, and the like—th the extra cost of electrostatically pain ing the complete units is not so muc that he could afford to lose his hig production rate.

"On the other hand, another re manufacturer feels his painting cos are cut 25% if pre-coated sheet is use and that it is more economical for hi to cut back his production to gain th saving."

So far, there is no sure-fire formu for determining which process to use you happen to manufacture a produ which may be finished either way. Bu which ever process loses out in eac specific case, Enameled Steel & Sig will still be the winner.



■ *One side of aluminum strip is being roller coated on Gasway unit. The coatin head is the only part of the line which Enameled Steel did not construct itself. Firs also built its own electrostatic equipment.*

WHEN you stamp your own aluminum circles or any irregular blanks, up to 25% of coil weight ends up as scrap.

You can eliminate this waste—plus labor of shearing and blanking—by buying circles or blanks direct from Fairmont.

Fairmont is *the* source for circles. As a prime supplier of aluminum blanks to *every* utensil maker, Fairmont's 30-year stockpile of dies is unduplicated anywhere. Find out how easily we can fill your requirements from our stock of dies.

Or by blanking from your dies in our plant, we can effect labor, material savings for you.

Other Fairmont benefits: the consistent quality that is a Fairmont tradition . . . individual flash annealing for finer grain structure . . . 100% inspection of every blank.

FIND OUT ABOUT FAIRMONT'S CUSTOM BLANKING SERVICE NOW

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News Products and People

Amphibious Army Truck Is Almost All Aluminum

The unsinkable XM-521, an aluminum research vehicle built to provide maximum swimability with minimum weight, may score a significant first for the Army in the art of tactical vehicle design, claims Kaiser Aluminum and Chemical Co.

The XM-521 has a unitized body constructed of thin aluminum honeycomb panels—the first major utilization of this design feature in trucks.

Sixteen times stronger than an equal weight of steel, and ten times stronger than an equal weight of aluminum sheet, the aluminum honeycomb is also very buoyant.

The vehicle was designed by the Detroit Arsenal under the direction of the U. S. Army Ordnance Tank-Automotive Command. The Evansville Defense Division of Whirlpool Corp. fabricated the body.

Capable of performing with equal flexibility on inland waters or rugged cross-country terrain, the XM-521 can be transported by cargo aircraft and dropped by parachute. It is compact, light, yet able to carry a 5000 pound payload (or 16 men with full equipment) while traveling at speeds up to 55 mph on roads and 5.2 mph in water. Virtually unsinkable, the XM-521 is able to "swim" even when completely swamped with water.

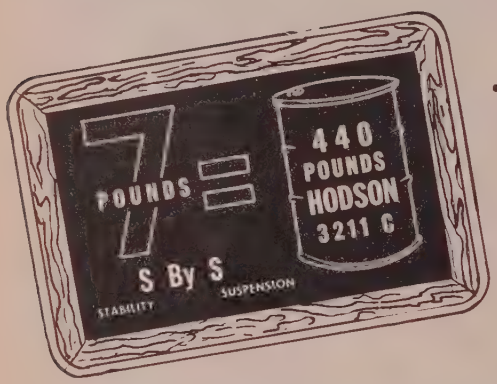
Buoyancy is provided by the aluminum honeycomb panels which form air-tight cells and by the utilization of polyurethane foam in wheel well sponsons.

Each honeycomb panel is made up of a core of hexagonal aluminum cells. The cores themselves are 97% air and 3% metal.

Almost totally aluminum, the XM-521 has a curb weight of 5000 pounds as compared with a curb weight of 12,000 pounds for the standard 2½ ton trucks used during the Korean War.

In addition to the aluminum honeycomb panel construction, the vehicle also utilizes a high strength forged aluminum suspension system, a split aluminum wheel and brake drum assembly, aluminum axle, transfer case housing, engine, bumpers and other aluminum components.

Most of the aluminum used in fabrication was alloy 7075-T6, for load carrying members. Other alloys used were 2024, 6061 and alloys in the 5000 and 3000 series.



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It is The Hodson Corporation's revolutionary new aluminum extruding compound — No. 3211 C Aluminum Extrusion Powdered Concentrate.* Material is anhydrous; is shipped in powder form. It contains the finest micronized graphite, with bactericides, fungicides, jelling, bonding and anti-weld agents. All free of occupational hazards and not detrimental to equipment or finished extrusions. *Patent Applied for

ADVANTAGES ARE:

1) Being anhydrous, shipping charges are reduced (made via parcel post). Seven lbs. of No. 3211 C make 440 lbs. — a full drum of finished extrusion compound.
2) Cost per pound of the finished compound at the press is between 4¾c to 5c. Result: Approximate savings up to 66% over some types of aqueous graphite compounds.
3) No storage or shipping difficulty from freezing or breakage.
4) Extends die life; reduces down time.

Being used successfully by extruders in all areas of the United States, Canada, and several European countries.

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☐ Conventional Forging Compounds ☐ Smokeless Forging Compounds

Galvanized Steel Corrosion Decreased by Zn-Mg Alloy

A zinc-magnesium alloy which improves the corrosion resistance of hot dipped galvanized steel is being sold by the Eagle-Picher Co., American Building, Cincinnati, Ohio.

Studies by Dow Chemical Co.'s Electrochemical Metal Cleaning Dept., Freeport, Texas, have shown that small amounts of magnesium in the galvanizing bath improve corrosion resistance of the coated metal. But the only method of applying the new process has been to add magnesium ingot directly to the bath.

The new alloy (97% prime western zinc, 3% magnesium) is designed to simplify the process and will be used in combination with regular prime western slabs.

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oungstown Sheet & Tube, Indiana Harbor · Columbia–Geneva
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Tin-A-Lum possesses **GREAT TENSILE STRENGTH** (up to 55,000 psi) . . . **HIGH CORROSION RESISTANCE** (greater than the parent metal itself) . . . and in many cases **WILL OUTMODE WELDING AND BRAZING.**

Tin-A-Lum provides **UNPRECEDENTED EASE OF APPLICATION . . . AMAZING DURABILITY . . .** and **REMARKABLE ADAPTABILITY TO ALL MANUFACTURING PROCESSES** (rolled, pressed, molded to almost any shape, drawn or extruded).

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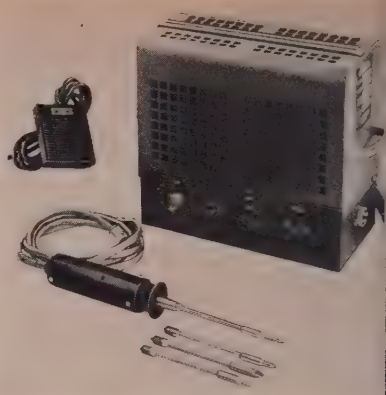


Ultrasonic Iron Solders Aluminum Without Flux

Development of an eight-ounce 10 watt ultrasonic soldering iron, capable of soldering a wide range of material without flux, is reported by Vibro-Ceramics Division, Gulton Industries Inc Metuchen, N. J.

The low-cost iron is claimed to be ideal for soldering semiconductor materials as well as metals such as aluminum, magnesium and their alloys especially those characterized by very rapid surface oxidation. The new unit completely eliminates surface pre treatment as well as flux removal.

The unit operates on normal 115 volt, 60-cycle power, and uses standard replaceable General Electric soldering iron tips of various configurations.

"The combined high efficiency of the unit's Glennite Hi-Temp Ceramic Transducer and the mechanical horn overcomes the serious problem of surface oxidation encountered in conventional soldering of materials such as aluminum and magnesium," claims Bernard Heiman, Gulton general manager.

Oxide films are removed by the ultrasonically activated tip, and the molten solder then forms an intimate bond with the surface of the metal without the use of flux.

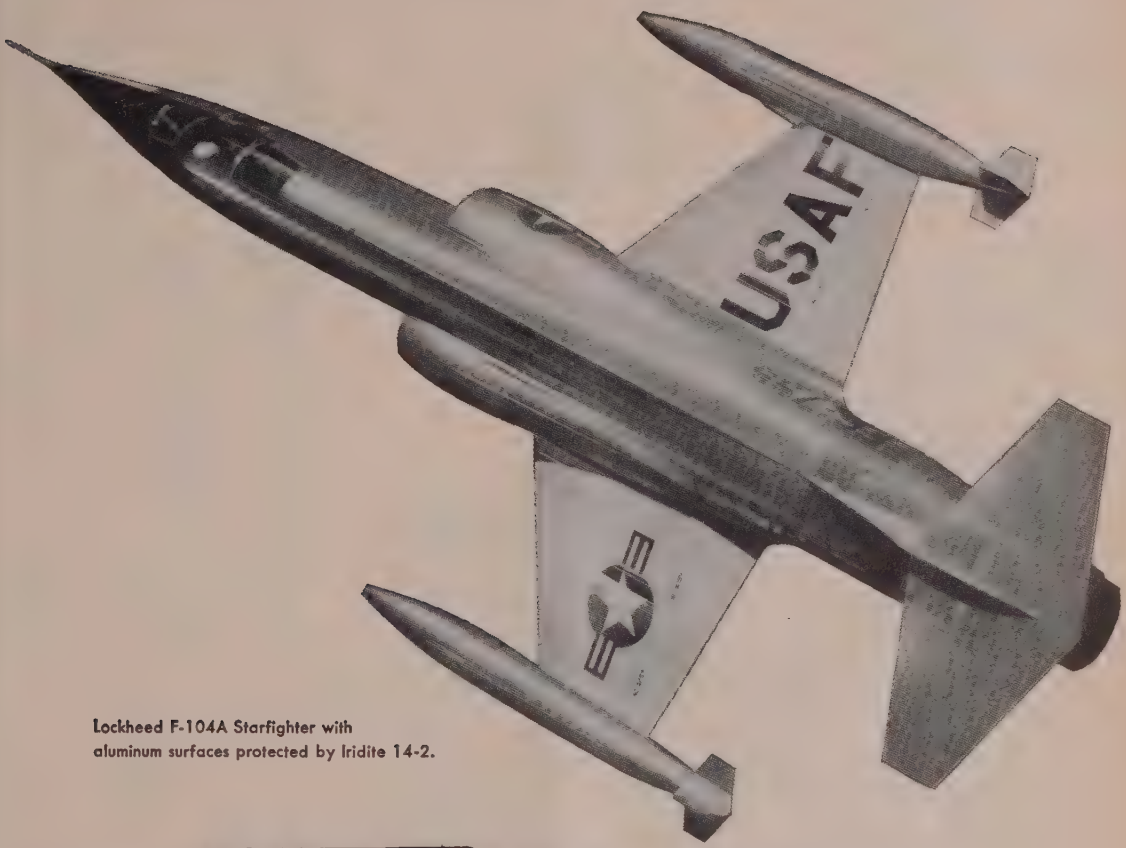
The soldering iron is easy to operate and unskilled workers can easily be trained in its use in a matter of minutes. Designated Model S-10, it is being sold nationally for $249.

Super Adhesion Claimed For Clear Metal Coating

A water-white, clear protective finish for chrome, silver, brass, aluminum, zinc, steel and other metals, has just been developed by Universal Paint Varnish, Inc., Bedford, Ohio.

Called Universatile No. 8058, the coating is said to have exceptional good adhesion and toughness; can be air or bake-dried to a hard high-gloss finish.

Looking For Savings? Then Read . . .



Lockheed F-104A Starfighter with aluminum surfaces protected by Iridite 14-2.

How IRIDITE® Helps Lockheed Cut Aluminum Finishing Costs

Nine years ago, Lockheed switched from anodizing to Iridite chromate conversion coatings. That year, they saved over $40,000 in materials and manpower.

Today, Lockheed is still saving money with Iridite 14–2. Here's how:

Process time is reduced from 45 minutes to a maximum of only 5 minutes. Three times as much work is processed in a single run. Easy-to-load baskets, replacing costly anodizing racks, save $15,000 per year. Expensive electrical equipment is eliminated because Iridite is a simple chemical dip.

Moreover, Iridite 14–2 gives improved corrosion resistance, easily meeting MIL–C–5541, and provides excellent paint adhesion.

More than likely, Iridite can save you money and give you better finishing results than your present method. Discuss it with your Allied Field Representative. Or, write for literature.

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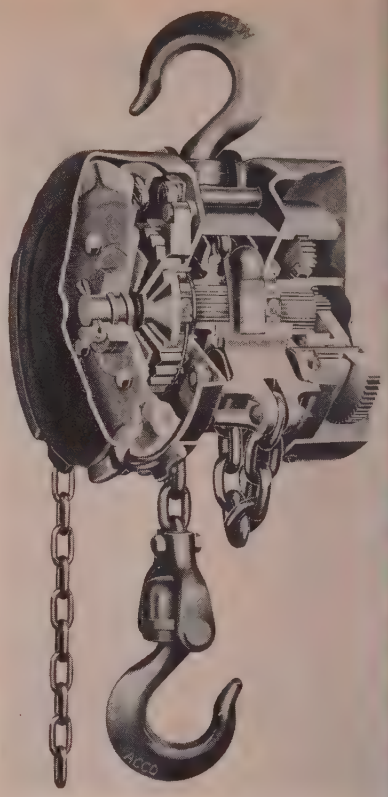

Aluminum Hand Hoist Is Light but Strong

Strength and light weight are features of the Wright Aluminum Safeway hand hoists. Using aluminum in non-load carrying components to decrease weight, they have been designed for portability by the Wright Hoist Division, American Chain & Cable Co., Inc., York, Pa.

Lightweight and rugged in construction, load-bearing parts are of strong, ductile, shock-resistant alloy steel. Aluminum has replaced heavy steel covers, heavy steel hand chain, and other parts such as chain guide and nut, to make it a lighter, more easily portable hoist.

Self lubricating, only an occasional refilling of the oil reservoir is necessary to lubricate the hoist. The chain and load wheel are lubricated by a wick-type oiler fed from the reservoir, while the gear train is enclosed in a permanently lubricated, oil tight chamber.

None of the features of the original Safeway hoists have been omitted. Its planetary system gear train is built from modified involute stub tooth gears, with all gear teeth cut from solid steel blanks. Its load brake, with uniform composition lining and silent pawl, is of the Weston type.

Available in capacities of ½, 1, 1-½, 2, 3 and 4-tons, the smallest aluminum Safeway hand hoist weighs only 35 pounds while the largest unit weighs 117 pounds.

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A new dry acid salt that
cleans and deoxidizes aluminum
in one safe, fast operation
simplifies costly waste treatment
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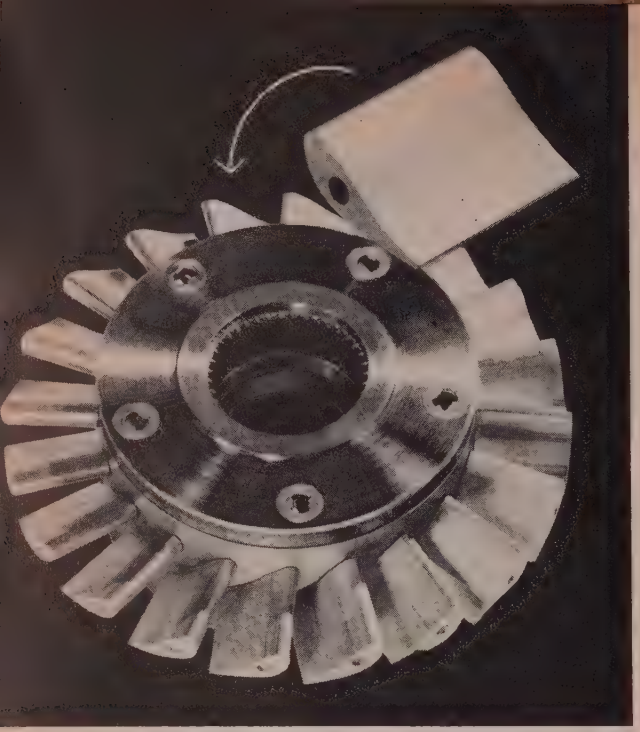
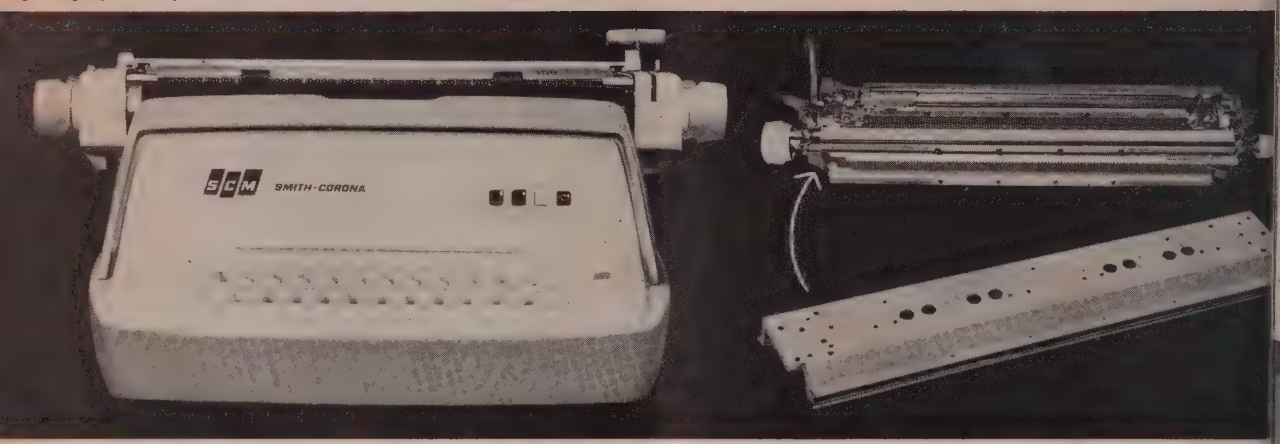


Automotive transmission stator blade

Printer's furniture, The Challenge Machinery Company

Lightweight precision part for Smith-Corona "400"



ELIMINATE MACHINING, CUT PRODUCTION COSTS WITH MAGNESIUM PRECISION EXTRUSIONS

These close-tolerance parts were produced with no machining costs! They're Dow precision magnesium extrusions which require only end trimming or cutting to length before use . . . and where transverse holes are needed, drilling and tapping. Dow precision magnesium extrusions help manufacturers cut production costs, while providing tolerances as close as ± .001 inch on critical cross-sectional dimensions, dimensional stability and light weight. There is no machining on the typical parts above . . . component for the ultra-modern Smith-Corona "400" Office Electric Typewriter; The Challenge Machinery Company's printer's furniture; and automotive transmission stator blade. Precision magnesium extrusions can be produced with sharp V's, thin notches, and accurate serrations. Complex parts can be given a consistent precision fit. For information, write to THE DOW METAL PRODUCTS COMPANY, Midland, Michigan, Merchandising Dept. 1104CQ6.

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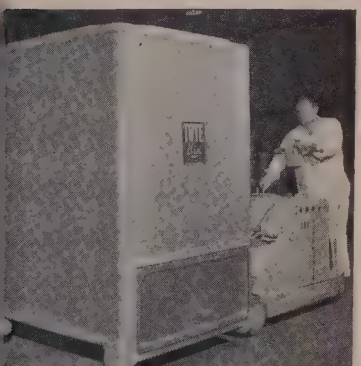
EW DOW MAGNESIUM ALLOY ZE10A

ıigh welded joint strength and no stress relief!

New Dow magnesium alloy ZE10A needs no post-welding stress relief. This strong sheet alloy is ideal for fabricating containers, vehicle bodies and other structures . . . and for field repair operations where stress relief can be a real problem.

ZE10A provides very high welded joint strength, important in butt welding of plates. The result—strong, stiff weldments of very light weight . . . with greater capacity, pound-for-pound, than structures made from any other metal!

To weld ZE10A sheet to extrusions, use Dow extrusion alloy ZK21A. No stress relief required. For further information and data, write THE DOW METAL PRODUCTS COMPANY, Midland, Michigan, Merchandising Dept. 1152CQ6.



ZE10A makes light, strong containers, like this Tote Bin, built by Tote Systems, Inc., Beatrice, Neb., a subsidiary of Hoover Ball and Bearing Company.

DOW

E DOW METAL PRODUCTS COMPANY
Division of The Dow Chemical Company
Midland, Michigan

Extruded, Anodized Pole Supports Giant Umbrella

A huge aluminum and nylon portable umbrella is being manufactured as a regular stock item by Aeroaffiliates Inc., Fort Worth, Tex. The collapsible umbrella is 26 feet in diameter and 15 feet tall. It has hinged aluminum ribs which fold for easy handling and storage.

The umbrella is supported by an 8-inch color anodized pipe that has been extruded from alloy 6061-T6; aluminum pipe is used for ribs. The vinyl coated nylon umbrella section also comes in colors.

The complete unit weighs 286 pounds. A rotator for the umbrella is optional.

Die Casting Houses Small Plane Safety Device

If more airplane pilots are walking away from minor crack-ups these days, it could be because they're using inertia locking shoulder-harness reels as part of their safety equipment.

The little device is attached to an I-beam behind a plane seat, and is connected by a 3/32-inch woven wire cable to special harness worn by the pilot. As the pilot moves around in his seat the cable pays out and re-winds automatically, keeping tension on the upper part of a pilot's body, but permitting freedom of shoulder movement.

During rapid deceleration or impact between 2 and 3 Gs (which would cause the pilot to be thrown violently forward) the inertia reel locks instantly, preventing any further payout in the cable, and keeps the pilot in his seat.

The idea was conceived by a Cornell University professor in 1943. He offered it to the U. S. Army Air Force who handed it over to American Seating Co., Grand Rapids, Mich., for development and manufacture.

The original simply-designed model has been reworked and ultimate strength of the cable and reel increased from 2800 pounds to 4000 pounds. The new unit has a deep drawn aluminum housing, made on American Seating's own Bliss and Cleveland presses, and a die cast ⅜-inch base plate.

After using the first reel the U. S. Air Force had another one developed that responds to inertia impacts from any direction. This reel has more complicated structural requirements, so the aluminum housing is die-cast. Ultimate strength of the 3/16-inch cable and reel in this model is 4000 pounds.

American Seating farms out the die casting work but does its own finish machining. All aluminum parts are anodized. Reel cases are given a zinc chromate primer over the anodize, to Government specs, and then enameled, depending on requirements.

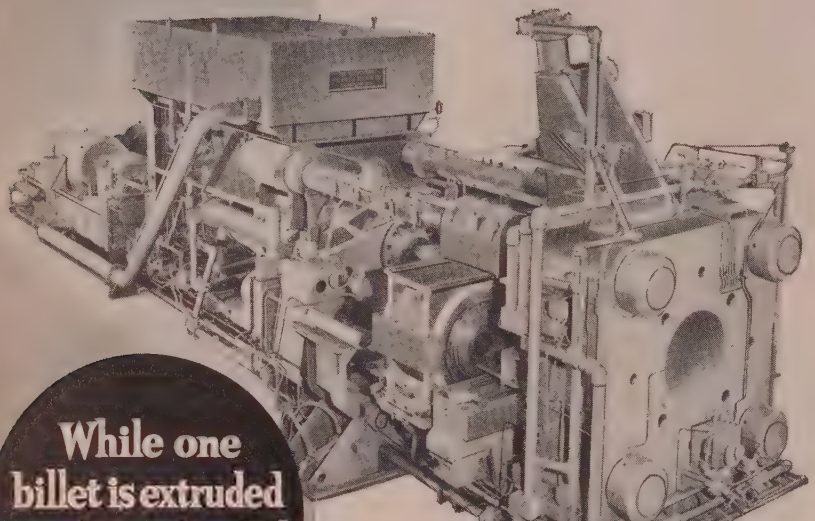
All the services are using these reels now as do the Department of Agriculture's conservation patrol planes. American Seating has also been selling them to U.S. and foreign plane makers.

American Seating has also developed a third reel that includes a pull-back device in addition to the inertia sensing element, and that will be used in ejection seats.

Dead Cycle Time Virtually Eliminated

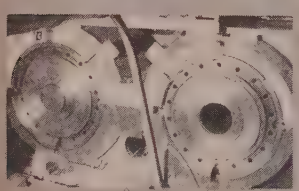
by "YOUNGSTOWN" Presses

with Dual Containers*, Double Die Slide*, Rapid "Rotac" Shear*



While one billet is extruded another is loaded *automatically*

with DUAL CONTAINERS



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Flexibility of Die Slide Design permits easy adaptability for extrusion of copper and brass. Auxiliary components enable operator to eject "skulls" from container and to load billets while billets are being extruded.

Double tooling permits cooling without detracting from cycle time.

Properly cooled dies permit higher extrusion speeds. It reduces pickup and produces the ultimate in surface quality.

"Rotac" shears in approximately 2 seconds —¼ the time of conventional butt shear.

Whether your need is for a complete extrusion plant, a new press, auxiliary equipment, or revamping of present equipment, it will pay you to consult a "Y F & M" extrusion engineer.

**Patent Applied For.*

The Youngstown Foundry & Machine Co.

Youngstown 1, Ohio

THE YOUNGSTOWN FOUNDRY & MACHINE CO. 75th ANNIVERSARY SERVING INDUSTRY SINCE 1896

Aluminum Renovates Railroad Rolling Stock

The Alton and Southern Railroad East St. Louis, Ill., is using aluminum to convert aging boxcars into money making rolling stock.

Alton and Southern, class I switching and terminal railroad operating in the St. Louis-East St. Louis gateway, has completed renovation work on the first of 10 cars slated to be rebuilt with aluminum lining, flooring, eight-foot doors, running boards, and brake steps. The cars represent the first composite use of these aluminum railroad accessories, claims Aluminum Co. of America.

The renovated 40-foot, 6-inch cars which A & S plans to release for regular interchange service with other railroads throughout the country, will be capable of handling a wide range of commodities.

The aluminum floor, a new product designed and produced by Alcoa, consists of multi-leg, eight-inch wide, extruded "planks" (see photo), joined by spaced welds. The floor provides a 7-inch platform with nailing grooves between the planks. The welds insure against closing or widening of the nailing slots regardless of length of use.

Design of the aluminum extrusions, each of which has four legs, permits the floor to support fork truck loads of 18,000 pounds on a single axle having two 12-inch tires, without dishing, cupping, or warping.

Weight saving for each car—due to the light-weight flooring, lining, and doors—is over 3000 pounds.

ɔrless Coating Protects nitectural Aluminum

lear, colorless coating for alumi- has been developed by In Chem 2627 N. Mutter St., Philadelphia

Chem Co 7122 was designed pri- to protect architectural alumi- during building erection. It may ɔe used for the protection of all ıs and nonferrous metals, says the

e coating polymerizes to a tough r and acid-resistant film. When d, pieces dry to handle in less than minutes. Although it is a poly- ing type coating, it needs no curing s and requires no baking.

ɔoratory and field tests have shown 7122 is capable of protecting plain etched aluminum surfaces from nd mortar stains; vinyl plasticizers t attack the film. Therefore, stick- nd blackening problems frequent- countered in aluminum window facturing, for example, are elimin- claims In Chem.

y Aluminum Rivets emble Electronic Parts

ny aluminum rivets only 5/64 of ch long are used by Dyna Magnetic es, Inc., to assemble components earing aids, stenographic dictating ɔment, and transistor radio re- rs.

ıe diminutive fasteners are pro- l by Alcoa at its Lancaster (Pa.) s from 0.042-inch diameter wire. cold-heading machine batters the into rivets at a machine-gun-like yielding over 90,000 pieces from ɔound of the ultra-thin strand.

oto shows rivets grouped in the r of a ring of components from of the Dyna Magnetic hearing de- Assembly steps are demonstrated ollowing the parts clockwise from eft of the standard size paper clip. ıe first two small pieces to the left ıe paper clip, used as conductors, the half of the shell with the hole e top are aluminum screw machine ucts made by Alcoa.

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You name it and *Pfister* will manufacture your aluminum tubing to the exact form you want — forty foot lengths or cut to two inch pieces — packed on open skids or individually tissue-wrapped and boxed. Whatever I.D., O.D., gauge, alloy or finish you require, *Pfister* is ready and able to accommodate you. If you want your tubing to telescope, slip fit or force fit; just name it.

Pfister is noted for its exceptionally bright finishes and consistent high quality. At *Pfister* great care goes into each customer's order.

In keeping with its policy of tailoring tubing to your every need, *Pfister* offers a wide variety of fabricating facilities. Not only can you be sure of the finest quality and a range of services from *Pfister*, but you can count on fast delivery, too!

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EXTRUDED SHAPES
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Pfister ALUMINUM CORP.

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FIVE MANUFACTURING PLANTS — STOCKS IN VARIOUS CITIES

Die Casting Quality Improved by Post Heating

Automated gradation post-heating machines manufactured by Selas Corp. of America, Dresher, Pa., step up production and quality of die cast aluminum rotors for electric motors, claims the firm. In some instances, the heat imparted to the rotors for post-heating also shrink-fits the shafts and rotors.

Stray filaments of aluminum, forced between the steel laminations of the rotors during die-casting, tend to reduce motor efficiency. These are broken up by post-heating—conveying the rotors in rotating fixtures through two radiant heat zones to raise the rotor temperature to a point just below the melting point of the aluminum. This heating causes differential expansion between the steel laminations and the die-cast metal, with a tendency to shear and round off the stray portions of the aluminum conductor bars that have been forced between the steel laminations.

Rotors are post-heated in 3 to 4 minutes at production rates up to 400 per hour. Cycles can be altered to accommodate various sizes and shapes of rotors by adjusting the conveyor speed or the temperature setting, or both.

Room air and manufactured or n ural gas, propane or butane, deliver at constant pressure and in controll ratio mixture by a Selas Combusti Controller, burn completely on cup-shaped refractory surfaces of Du diant burners which are position in the outer walls of the circular m chine. This produces radiant heat th is beamed to the rotors, at high therm gradient, without flame impingement

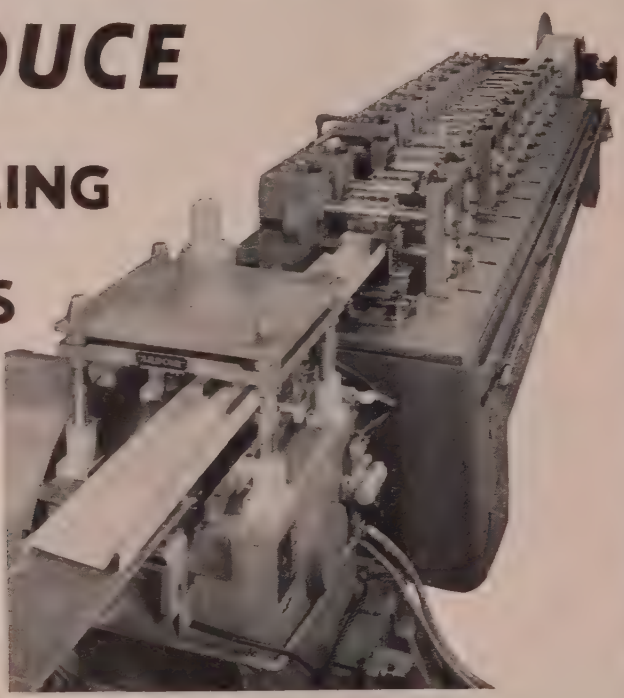
Other claims for the unit: Sets prod tion pace with steady output; smoo production flow; eliminates human ror; can be in full production in m utes; heats work rapidly and cle saves floor space; uses standard fuel.

REDUCE

FORMING

COSTS

with



AMERICAN ROLLER DIE CORP.
ARDCOR

Roll Forming Production Lines

ON PARTS FOR... BASE BOARD HEATING UNITS
STORAGE RACKS
ALUMINUM SIDING
CURTAIN RODS AND MANY OTHER SECTIONS

American ROLLER DIE CORP.
29510 Clayton Avenue Wickliffe, Ohio

ARDCOR

DESIGNERS, ENGINEERS AND BUILDERS. Single Roll Forming Machines or Completely Automated Production Lines for Cold Forming, Ferrous and Non-Ferrous Electric Weld and Lock Seam Tube Mills • Forming Rolls, Tubing and Pipe Rolls • Straightening, Pinch and Leveller Rolls • Cut-Off Machines • Slitters

Titanium Aircraft Wheels Can Withstand 1000°F

A rust-proof aircraft wheel that w withstand more than 1000°F is made titanium by the Goodyear Tire & R ber Co., Akron, Ohio, to meet the sev operating requirements of high spe jet aircraft. The wheel can also be u on prop-driven planes.

The firm says the new wheel h passed successfully all necessary te and can be produced commercially.

The titanium wheel is lighter th aluminum or magnesium and lea more space for brakes because its s tions are thinner, a Goodyear spok man says. Titanium wheels also able to withstand greater impact lo without failure because of better fle bility.

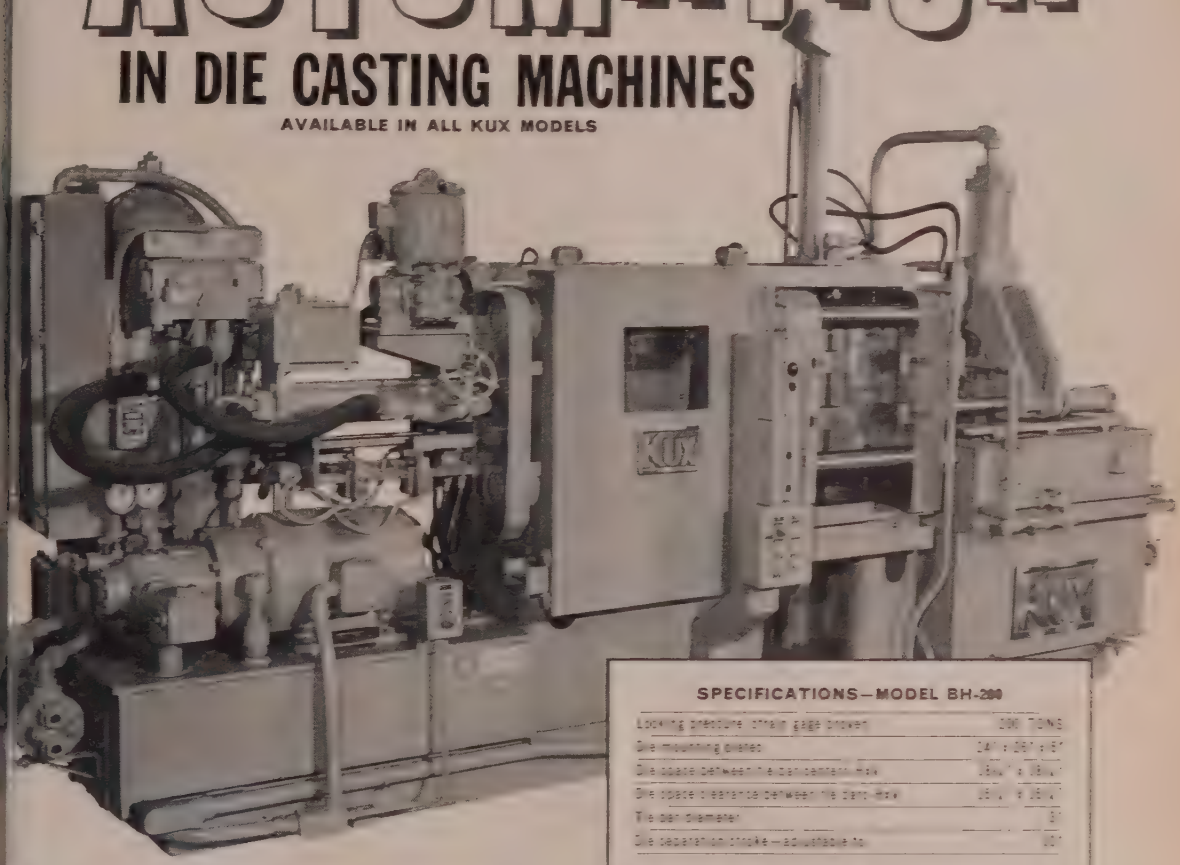
Since titanium conducts heat at very low rate, the new wheel helps ke tires cool because little heat is tra mitted to them from the brakes, acco ing to the company.

Another **KUX** unsurpassed design superiority

AUTOMATION

IN DIE CASTING MACHINES

AVAILABLE IN ALL KUX MODELS



SPECIFICATIONS—MODEL BH-200	
Locking pressure, strain gage proven	200 TONS
Die mounting plates	24" x 26" x 6"
Die space between platens, max.	28½" x 28½"
Die space clearance between tie bars, max.	25½" x 25½"
Tie bar diameter	5"
Die separation stroke—adjustable to	20"

Up to 900 free cycles per hour . . .
500 to 700 casting cycles per hour } AUTOMATICALLY — CONTINUOUSLY

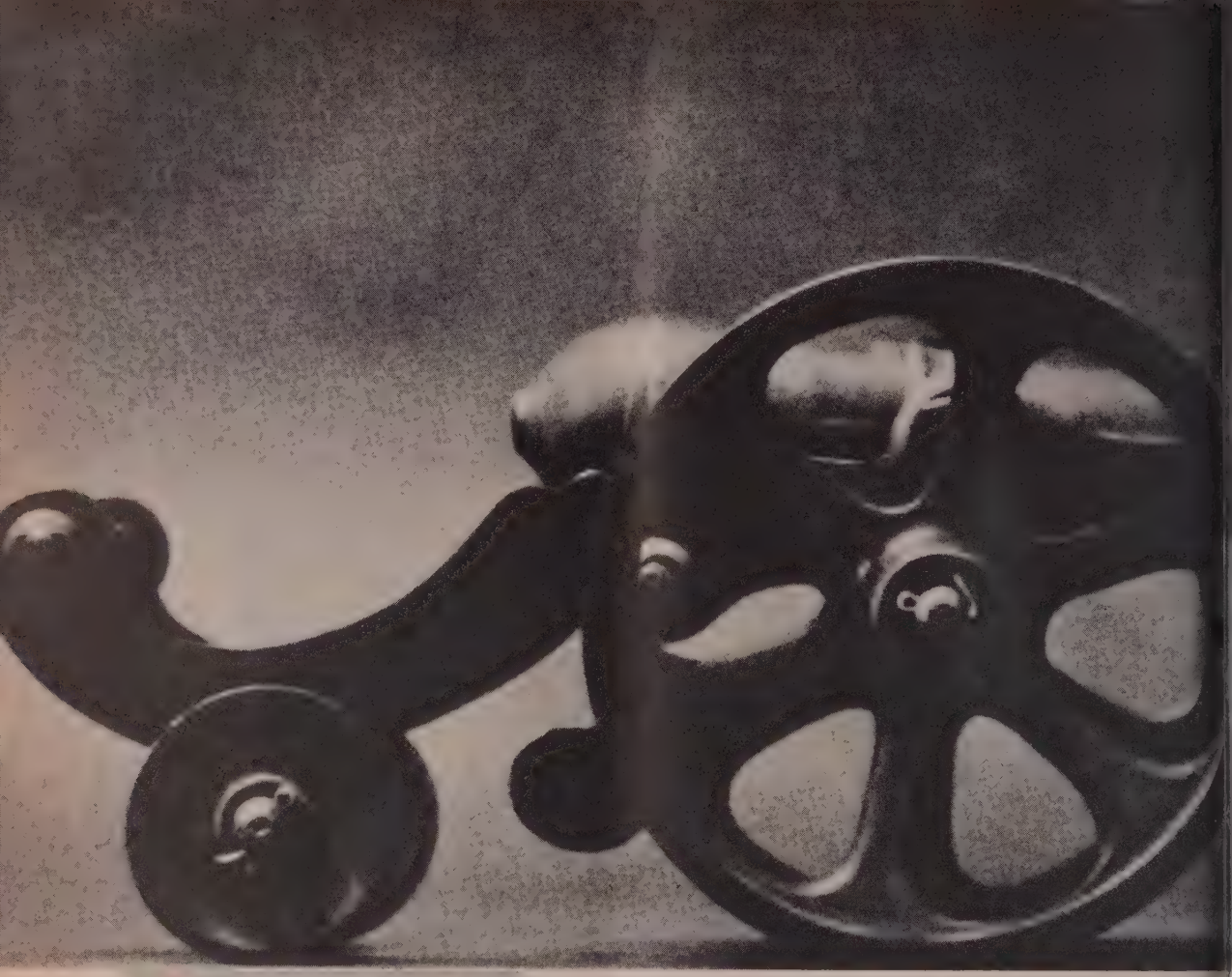
You're looking at the new KUX Model BH200—the 200-ton strain gage proven hot chamber die casting machine, which will continuously produce vast quantities of hardware finish castings with minimum maintenance and down time. Automatic operating mechanism permits a cycle with a full 10" of die movement and 6" of metal injection stroke in 4 seconds. A 9¼ lb. zinc shot can be produced in this heavy duty machine at 1800 PSI injection pressure. Sensing safeties retract the die plate and prevent recycling of machine if there is flash on the die surfaces.

Incorporated into this machine cycling mechanism is a low pressure approach of the moveable die plate, flash sensing shut offs, air jets for cleaning die faces, casting sweep arm, and die lubricating unit with adjustable interval timing. Also available in cold chamber models for casting aluminum with KUX "AUTO-FEED" system of vacuum die casting.

ADDITIONAL FEATURES in the 28 all-new strain gage proven KUX models are the revolutionary "VAC-U-DIE" and "AUTO-FEED" systems of vacuum die casting—motorized die height adjustment mechanism—and the patented KUX injection pressure multiplier for cold chamber models with injection pressures up to 36,000 PSI and plunger speeds up to 12,000 inches per minute.

KUX MACHINE CO. (Dept. MM)
6725 North Ridge Avenue, Chicago 26, Illinois

Write for full details of the 28 all-new KUX models illustrated in the latest KUX Die Casting Machine Catalog.



1953 658,022,000 LBS. OF ALUMINUM FOR CASTINGS
1959 786,399,000 LBS. OF ALUMINUM FOR CASTINGS
1965 1,000,000,000 LBS. OF ALUMINUM FOR CASTINGS*
*SOURCE—FOUNDRY MAGAZINE

ACT ALUMINUM CONSULTING TEAM

What is ACT? The Aluminum Consulting Team is an exclusive Kaiser Aluminum customer service designed to provide expert assistance in all phases of the production of aluminum castings. This includes the successful installation of an aluminum casting operation in an existing gray iron foundry . . . as well as technical assistance to customers on foundry practices, product engineering, product design and product marketing. These services are designed to increase your aluminum casting sales.

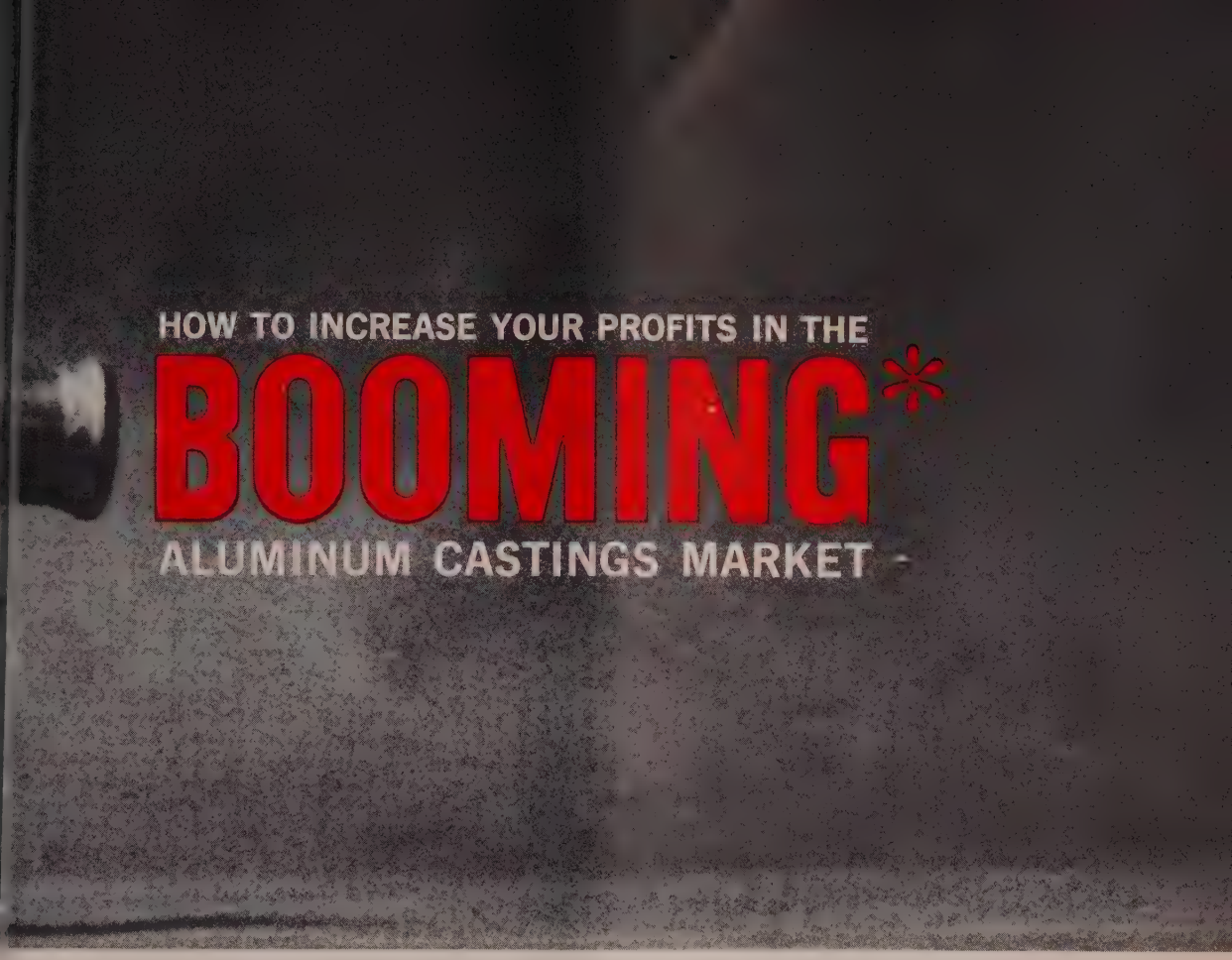
Why ACT? ACT has been created to help qualifie foundries take advantage of the present and anticipate demands for aluminum castings. MODERN CASTING official journal of the American Foundrymen's Societ in its January, 1961 issue headlined it this way: "Brigh future forecast for aluminum castings . . . Industry leade predict up to 300 per cent growth in next five years . . Applications are almost unlimited where light weight an corrosion resistance are needed."

How ACT can help you: For foundries NOW casting aluminum or those interested in STARTING a aluminum castings operation . . . ACT can offer:

1. ASSISTANCE FOR QUALIFIED FOUNDRIES NOW CASTING ALUMINUM

a. *FOUNDRY ASSISTANCE*—In this area ACT will render expert technical assistance in melting and fluxing practices, die and pattern design, proper gating, use of different alloys . . . their characteristics and behavior during and after casting . . . risering techniques, finishing operations and provide insights into castings defects stressing causes, effects and prevention.

b. *PRODUCT ENGINEERING*—ACT will hel foundries take advantage of the unique combination c properties offered by aluminum castings. Kaiser Alumi num's long experience with the design of aluminum cast ings for thousands of diverse applications can be put t work immediately. ACT will make engineering recom mendations to assure that the casting withstands th



sses applied in service. This includes counsel on the patibility of the aluminum casting to other com- ents. This product engineering service also helps imize scrap losses.

PRODUCT DESIGN—Here is an area of ACT as- ınce that can help make products more marketable making use of the many inherent design advantages luminum. ACT can help in choosing from the many ilable finishing techniques. Aluminum's light weight, n strength and yield characteristics add up to an ealing and more salable design.

PRODUCT MARKETING—ACT can help find , better and larger markets for aluminum castings or gest new products for current markets. Qualified ndries will be supplied with data on any specific mar- and assistance in market research that will indicate size and potential of the market, competition and rela- profitability.

. ASSISTANCE FOR FOUNDRIES NOT STING ALUMINUM

FOUNDRY DESIGN—ACT will offer, to qualified pondents, engineering assistance in setting up an alu- um foundry. This includes expert technical service in nt or department layout, equipment recommendations, ting and fluxing practices, die and pattern design, per gating, the use of different alloys and many other ven aluminum foundry techniques.

b. *ASSISTANCE IN SWITCHING YOUR CUSTOMERS TO ALUMINUM CASTINGS*—ACT will assist you in converting your customers' castings to aluminum. Conversions of this type are given special attention in areas of redesigning molds to provide desired product strength, performance and appearance.

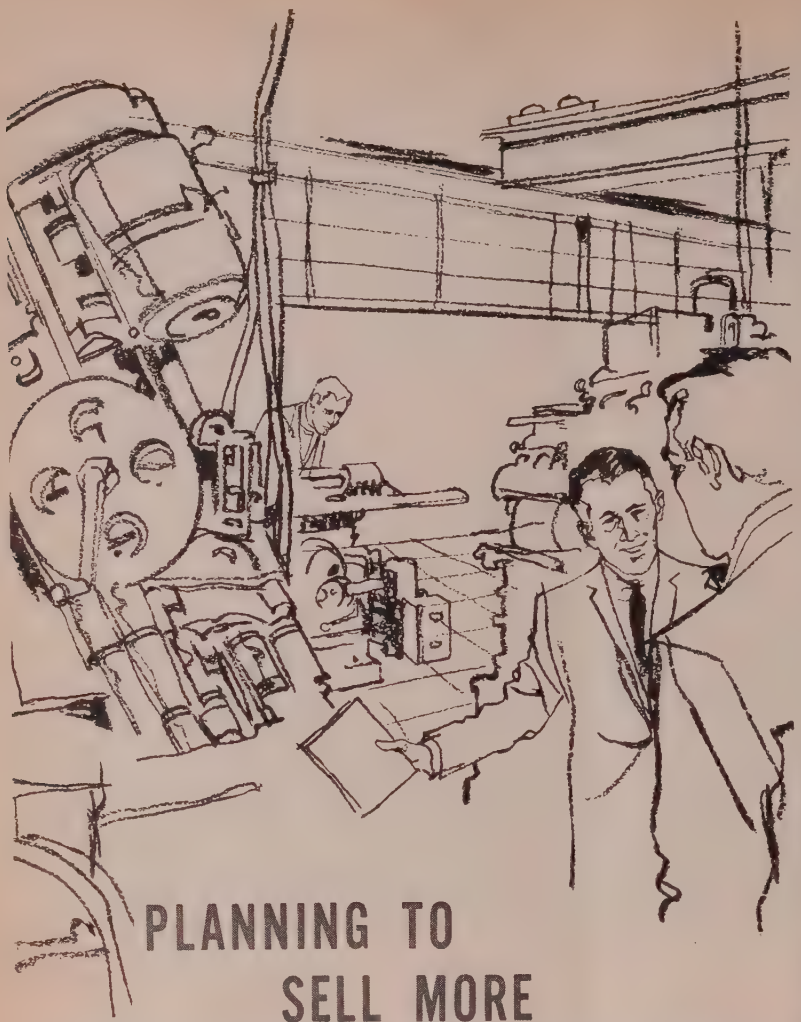
c. *FOUNDRY ASSISTANCE: PRODUCT ENGINEERING, DESIGN AND MARKETING*—ACT assistance in the major areas outlined above is, of course, available to assist your new aluminum foundry operation. *SPECIAL NOTE:* Kaiser Aluminum & Chemical Corporation will dispatch acknowledged experts to study individual problems and render specialized services. Under these circumstances, only a reasonable number of qualified foundries can be served over any given period. Applications for ACT foundry assistance will therefore be reviewed on an individual basis and assigned a priority.

HOW YOU GET INTO THE ACT: To find out more about this new concept in expert foundry assistance... fill out the attached card. The ACT booklet with the details of Kaiser Aluminum's Foundry Assistance program will be mailed to you immediately.

KAISER ALUMINUM

New leadership in the World of Aluminum

See HONG KONG and MAVERICK, ABC-TV Network



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ABOUT INDUSTRIAL TIME SALES FINANCING, the arrangement that helps manufacturers and dealers sell more income-producing equipment and machinery. Talcott Time Sales Plans are tailored to your needs. They can help you close more sales. Talk to any Talcott office for full details.

For booklet, "Four Keys to Business Growth," write to Daniel E. Grow, New Business, James Talcott, Inc., 227 Park Avenue South, New York 3, New York.

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ATLANTA • LOS ANGELES • SAN FRANCISCO

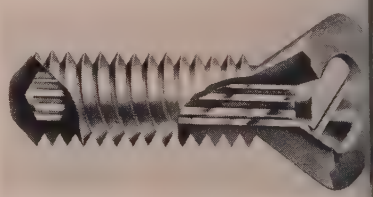
U.S. Intervenes in Kaiser, Kawneer Merger; Deal Flops

The proposed merger of Kaiser Aluminum & Chemical Corp., Oakland, Calif. and Kawneer Co., Niles, Mich. was terminated through mutual consent of the two firms before it could be put before stockholders meetings in May.

The merger plans became confused when the Department of Justice filed suit at St. Louis, April 27, claiming that the merger would be in violation of antitrust laws. A restraining order was entered in the court, which prevented any action from being taken at the stockholders meeting.

The two firms claim the merger would have strengthened competition and would not have violated any antitrust laws. However, a final decision on the case was expected to take three years and cost about $250,000. The companies terminated their agreement when they found it impossible to agree upon a number of basic matters pertaining to procedures and operations while the suit was pending. (Modern Metals predicted the deal would flop last January; see "Looking Ahead," p. 103.)

Shortly after this announcement was made, Kaiser filed a proposal with the Securities and Exchange Commission to sell 375,000 shares of common stock. At current prices this would raise some $ million, a portion of which would be added to Kaiser's working capital.



Nylon-Steel Screws Seal Joint; Resist Attack

A composite plastic-metal screw is a new development of Austin Screw Products Co., 4873 W. Armitage Ave., Chicago. The manufacturer says the combination of a threaded nylon outer body with a serrated steel core forms an integral fastening unit which provides high torque and shear strength, resistance to vibration and corrosion and other desirable features.

Called Insul-Screw, Austin claims that the new fastener is self-sealing by reason of the plastic threads which, as the screw is tightened, give enough to fill voids in the female threads. At the same time, the plastic thread acts as a pair of washers to make escape of liquids or gases improbable.

Insul Screws are stocked in the natural, off-white nylon color; however they are available in any color or shade at a slight additional charge.

Reduce finishing costs 40 to 60%

with this shortcut to a finished product

FoRM from BONDERIZED painted coil stock

Actual field experience and careful cost projections by manufacturers indicate that finishing costs can be cut 40 to 60% by using pre-painted coil stock. This is true for products formed from steel, aluminum or galvanized, using baked-on, high quality paints over Bonderite.

These spectacular savings result from decreased paint consumption and application costs per thousand square feet of surface.

Manufacturers of many types of products are taking advantage of these savings by using Bonderized, painted coil stock for their production now. Coil stock may be treated and painted in the plant, or purchased already Bonderized and painted, ready for forming and fabrication.

The Parker technical representative near you has full information on this revolutionary new way to reduce finishing costs. Or write to Parker, Detroit.

PROTECTED BY Bonderite PARKER RUST PROOF CO. QUALITY CORROSION RESISTANT

Parker Rust Proof Company
2198 E. MILWAUKEE, DETROIT 11, MICHIGAN

BONDERITE corrosion resistant paint base • BONDERITE and BONDERLUBE aids in cold forming of metals • PARCO COMPOUND rust resistant • PARCO LUBRITE—wear resistant for friction surfaces • TROPICAL—heavy duty maintenance paints since 1883

Since 1914—Leader in the field

*Bonderite, Bonderized, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

METALLURGIST WANTED

Major aluminum producer desires metallurgist for control and project work. Must be capable of planning and estimating cost of projects, as well as carrying out through to final reports with minimum of supervision. Permanent position; liberal benefits. Submit resume with salary requirements to:

BOX 622 — Modern Metals
435 N. Michigan Ave.
Chicago 11, Ill.

New Plant to Make Dies For West Coast Extruders

A new plant for producing extrusion dies for the west coast extrusion industry began operations this month, according to John Wall, president of PMD Extrusion Die Co., Warren, Mich. Located at 1309 Bayshore, San Jose, Calif., the plant supplements PMD's facilities at Warren, Mich. and Florence, Ala.

The San Jose plant, covering 6400 sq. ft., and employing 25 people, contains facilities for welding, heat treating, and machining. Future plans call for a broadened product line including permanent mold and die casting dies. The plant is under the supervision of A. W. Hamel, general manager for PMD.

Other companies associated with PMD are Permanent Mold Die Co., Piston Mold Die Co., and Permanent Machine and Tool Co. They produce permanent mold and die casting dies, piston or casting machines, extrusion tools & custom machine work.

Rolling Oil Price Cut 15% by Kerns United

A 15% price reduction on its Kl Strip 485 aluminum rolling oil has been announced by Kerns United Co 2657 E. 95th St., Chicago.

Kleen Strip 485 is a chemically co pounded product said to assure pro strip lubrication in cold rolling op tions and to provide cleaner, brigh stain free surfaces.

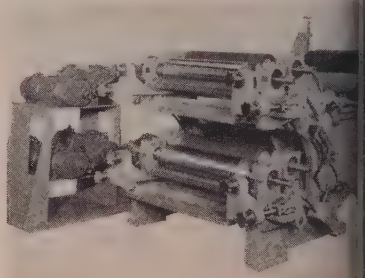
Previous price of 485 was 37½ c a pound (fob Chicago); the new pr became effective June 1.

Howe Sound Looking For Reduction Plant Site

Four areas are being considered Howe Sound Co. as possible locati for an aluminum reduction pla though the Port of Portland in Ore seems to be the likeliest prospect at present.

William B. Weaver, Jr., Howe pr dent, recently said that his company interested in constructing a plant in Portland, Oregon area, but that definite plans have been made. T Portland site in question is a 250-a tract located in the River Gate ind trial area. Per acre cost is said to about $2000.

Howe has also announced that plas will become increasingly important the firm, even though it will rem primarily interested in metals.



Standardized Roll Coater Paints Siding-Width Strip

A heavy duty strip coater for paint narrow or "siding" width aluminum has been standardized for use on lines m by /Ross-Waldron Div'n, Midland-R Corp., Box 791, SC, New Brunswi N. J.

This Ross-Waldron unit includes o top side and one bottom side coat head. (The photo shows an optio two-roll top side coating head.)

The coater can apply alkyds, acry and vinyls in a range of 10% to 9 solvents, to strip thicknesses from .0 to .030 inch.

Kenfucius say: *End Kenfusion Convert to Kenvert*

ALUMINUM CASTINGS WHITENED AND PICKLED WITHOUT BROWN FUMES

Finishers are finding new KENVERT No. 45 produces much whiter castings at lower cost. This new powder is safer, forms a more stable solution, controls speed of operation, eliminates brown nitrogen oxide fumes. It is used after an alkali etch to whiten and selectively remove free silica on castings prior to plating, burnishing or anodizing.

MEMO FROM CONDENSER CAN MANUFACTURER FOR AIR CONDITIONERS

KENVERT #18
excellent iridescent
Unexcelled humidity protection
RE-ORDER TODAY! 100 LBS. COST $60
treats 273,000 cans
14 sq. ft. of cadmium treated for 1¢

DO-IT-NOW

Bright dip cadmium in horizontal barrel with Kenvert #26 and get corrosion protection.

SPECIAL SAVINGS

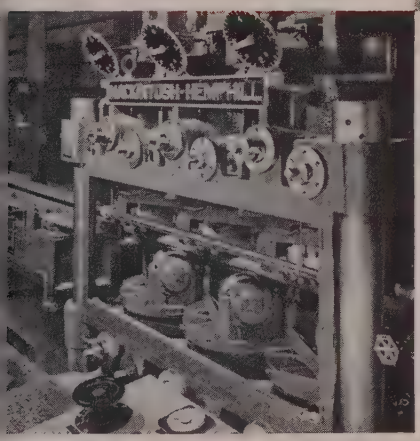
save with combination purchases of KENVERT brighteners and bright dips

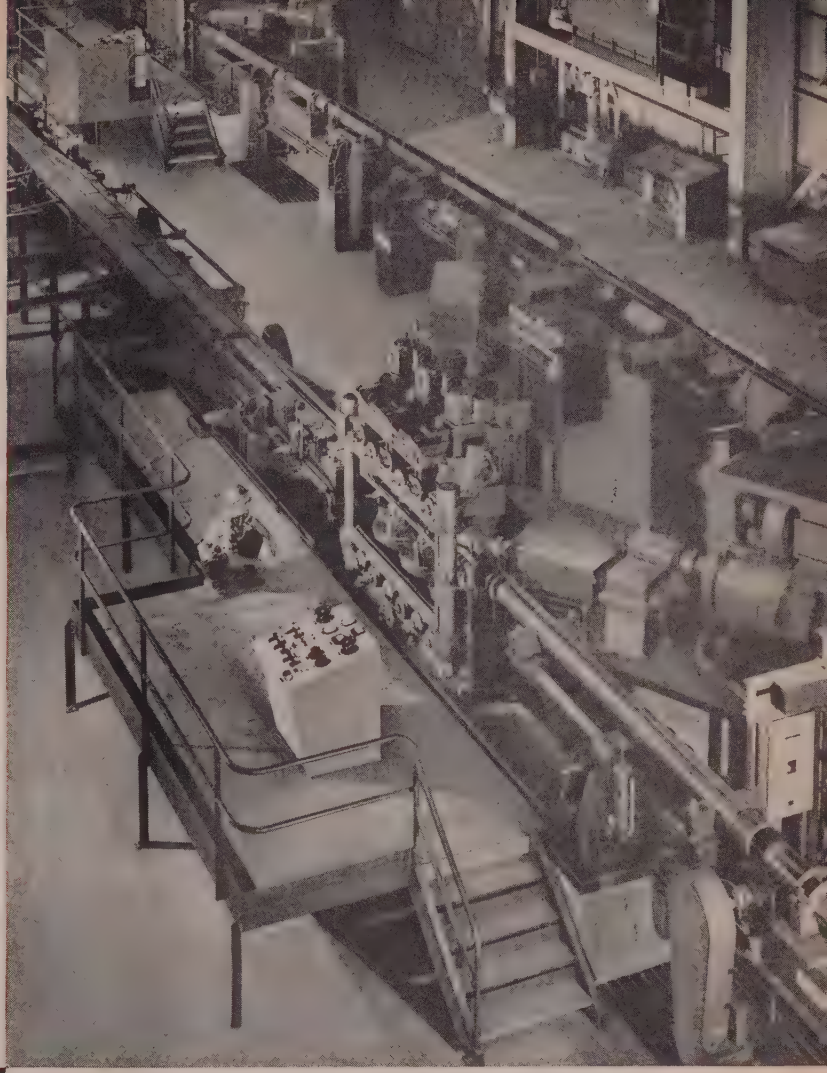
CONVERSION CHEMICAL CORPORATION
98 East Main Street
Rockville, Connecticut
TRemont 5-3357
LICENSEES:
Canada, England, Germany
Distributors throughout the U.S.

NEW DETERGENT REMOVES BUFFING COMPOUNDS FROM ALL METALS WITHOUT ATTACK

Replace costly solvents with SLUFF-OFF X. Leaves smut-free surface at solution cost of only 10c a gallon.

Why Mack-Hemp straighteners were selected for the world's most modern continuous weld pipe mill





The new continuous pipe mill at Lorain Works of U.S. Steel's National Tube Division is probably the most productive facility of its kind in the world, exceeding the record-breaking pipe mill at Fairless Works.

With straightness and roundness of delivered pipe more critical than ever, the Lorain Works assigns this important finishing task to two Mackintosh-Hemphill 6-roll guideless rotary straighteners. The two can process 1800 feet of pipe per minute. Finished pipe is perfectly straight and round, without spiral markings. "End hooks" at back and front are completely removed. Moreover, the straighteners' open three-post construction makes the rolls readily accessible, so that set-up time is cut to a minimum.

If you're concerned with straightening pipe or tube—no matter what the diameter or wall thickness—it will pay you to talk to Mack-Hemp. We have helpful information for you.

MACKINTOSH-HEMPHILL DIVISION PITTSBURGH, U.S.A.

BLISS

MACKINTOSH-HEMPHILL
Division of E. W. BLISS Company
Pittsburgh and Midland, Pa.

Bubble Test For Gas Improves Casting Quality

Small bubbles of gas emerging from a tiny cup of molten aluminum are now yielding critically important information in the production of quality aluminum castings, according to D. J. Neil and A. C. Burr, engineers from the research laboratories of Aluminium Limited.

In a paper presented to the American Foundrymen's Society recently, the engineers said the new initial bubble test developed by Alcan could quickly determine the gas content of aluminum melt—impossible to date.

Neil said the process promises important economies for the aluminum industry, as it has wide applications in the quality control of castings and wrought alloy ingot.

Four basic components are involved. An instrument cabinet contains the pressure and temperature gauges as well as a vacuum control valve and necessary outlets and switches needed for the vacuum pump and heater. Other components are heater unit, cover unit, and vacuum pump.

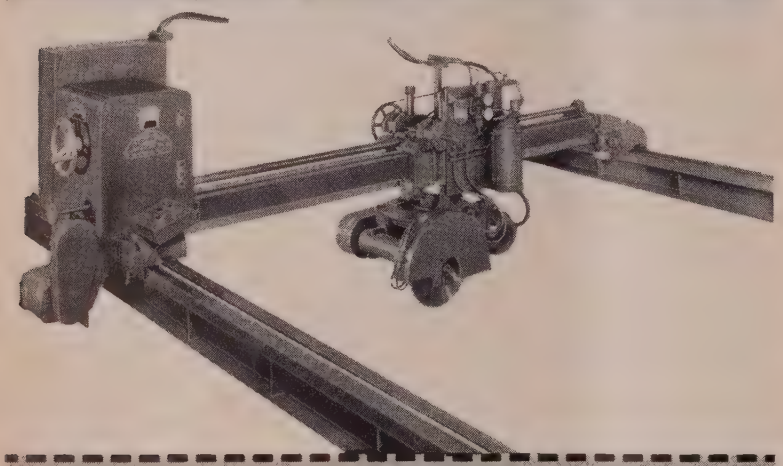
In operation, a molten metal sample is taken from the furnace and quickly placed in the small heater unit. The vacuum release valve is closed, vacuum pump switched on, and needle valve adjusted so pressure inside the heater decreases at the rate of approximately 5-10 mm. Hg per second.

As the solubility of hydrogen in aluminum alloys is a function of temperature and pressure, the hydrogen content can be determined by noting when the first traces of hydrogen precipitate from solution and rise as a bubble to the molten metal surface under a decreasing pressure.

While the pressure is being reduced the surface of the hot aluminum is watched carefully. At one point, bubbles of hydrogen will appear and calculations can be made to determine gas content.

A determination of the gas content may be made in approximately two minutes. The authors said the instrument known as the Hycon Tester, is now available commercially.

ECONOMY SAW CUTS SHEET STOCK WITH 4-WAY ACTION

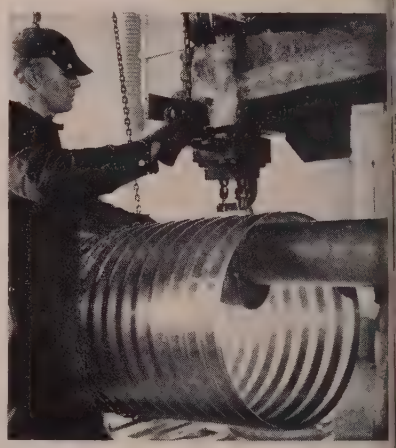


Accurate Squares up to 10 ft. Wide
Any Length — Cuts Metal or Plastics

The new Ty-Sa-Man Economy "111-CX" produces accurate square rectangles up to any length, and up to 10 feet wide, from stock up to two inches thick. Motor and arbor travel on a transverse rail, which moves along two side rails. This four-way movement, in combination with the 90 degree swivel head, permits trimming all four sides of a plate without moving it. Handling time is reduced to a minimum.

Ty-Sa-Man
SINCE 1885

Write for FREE BULLETIN
TY-SA-MAN Machine Co., Inc.,
820 White Ave., Knoxville, Tenn.



Culvert Sheet Line Being Developed

Aluminum culvert sheet is shown being riveted into "can" form at the Bealeton, Va. plant of Lane-Penncarva, Inc. It is part of the line of culvert sheet recently introduced by Reynolds Metals Co.

The sheet, made from a special alloy designed for maximum corrosion resistance, is priced competitively with other metal products for culverts. It is available in gauges of .060 to .135 inch and in sheet lengths from 28½ to 142½ inches. A .165 inch gauge will be added.

"We believe the total metal culvert market will approach $100,000,000 annually by 1970," K. J. Boedecker, Jr., Reynolds structural and highway market manager, said. "Because of aluminum's combination of light weight, strength and resistance to the corrosion and metal erosion which makes necessary frequent replacement of other metal culvert, aluminum should take a major share of this market," he added.

Where to buy METALWORKING

MATERIALS • EQUIPMENT • SERVICES

s buyers guide is published for light metals fabricators and product manufacturers o require materials, equipment and services for nonferrous metalworking. The firms ed are current advertisers in Modern Metals, and constitute major supply sources.

MATERIALS

AND ROD

ama Wire Co., Inc.
O. Box 648
orence, Alabama

inium Limited Sales, Inc.
0 Fifth Avenue
w York 20, New York

inum Co. of America
27 Alcoa Building
ttsburgh 19, Pa. (Al)

Smelting Co.
37 W. Taylor St.
icago 12, Ill.

geport Brass Company
Grand St.
idgeport 2, Connecticut

Dow Metal Products Co.
v'n, Dow Chemical Co.
idland, Michigan (Al&Mg)

mont Aluminum Co.
airmont, West Virginia

eral Extrusions, Inc.
40 Lake Park Road
ungstown, Ohio (Al)

ey Aluminum
rrance, Calif. (Al)

rnational Selling Corp.
0 E. 42nd St.
w York 17, N. Y.

er Aluminum & Chemical Sales
aiser Center
kland 12, Calif.

ols Wire & Aluminum Co.
avenport, Iowa (Al)

Aluminum
0 Park Avenue
w York 22, N. Y.

ision Extrusions, Inc.
0 E. Green St.
nsenville, Ill.

olds Metals Company
01 W. Broad St.
chmond 18, Va.

ill Manufacturing Co.
Mill Street
aterbury, Connecticut

hern Extrusions Company
orth Washington Street
agnolia, Arkansas (Al)

rior Industries, Inc.
86 Oakwood Ave.
ungstown, Ohio

ET, ALUMINUM

inium Limited Sales, Inc.
0 Fifth Avenue
w York 20, New York

inum Billets, Inc.
86 Oakwood Ave.
ungstown, Ohio

inum Co. of America
27 Alcoa Building
ttsburgh 19, Pa.

inum & Magnesium, Inc.
ndusky, Ohio

conda Aluminum Co.
O. Box 1654
uisville 1, Ky.

Smelting Company
37 West Taylor Street
icago 12, Illinois

ey Aluminum
rrance, Calif.

rnational Selling Corp.
0 E. 42nd St.
w York 17, N. Y.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Olin Aluminum
400 Park Ave.
New York 22, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Wolverine Tube Div.
Calumet & Hecla, Inc.
Dept. N, 17262 Southfield Rd.
Allen Park, Mich.

BILLET, MAGNESIUM

The Dow Metal Products Co.
Div'n, The Dow Chemical Co.
Midland, Mich.

BRAZING SALTS, ALUMINUM

Heatbath Corp.
Springfield 1, Mass.

Park Chemical Co.
8074 Military Ave.
Detroit 4, Mich.

CALCIUM METAL

Dominion Magnesium Limited
320 Bay St.
Toronto, Ont.

International Selling Corp.
220 E. 42nd St.
New York 17, N. Y.

CASTINGS, ALUMINUM

Aluminum Company of America
1227 Alcoa Building
Pittsburgh 19, Pa.

Federal Die Casting Company
2226 North Elston
Chicago, Illinois

Scovill Mfg. Co.
99 Mill St.
Waterbury, Conn.

Southern Die Casting & Engineering
206 Albertson Rd.
High Point, N. C.

CASTINGS, MAGNESIUM

Aluminum Company of America
1227 Alcoa Building
Pittsburgh 19, Pennsylvania

CIRCLES, ALUMINUM

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Fairmont Aluminum Co.
Fairmont, W. Va.

International Selling Corp.
220 E. 42nd St.
New York 17, N. Y.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

CLEANERS, ALUMINUM

Allied Research Products, Inc.
4004 East Monument St.
Baltimore 5, Md.

Amchem Products, Inc.
Ambler 12, Pa.

Conversion Chemical Corp.
99 E. Main St.
Rockville, Conn.

Diversey Corp.
212 W. Monroe St.
Chicago 6, Ill.

Frederick Gumm Chemical Co.
538 Forest St.
Kearny, New Jersey

Heatbath Corp.
Springfield 1, Mass.

The Hodson Corp.
5301-11 W. 66th St.
Chicago 38, Ill.

Kerns United Corp.
2659 E. 95th St.
Chicago 17, Ill.

Macco Products Co.
9220 S. Sangamon St.
Chicago 20, Ill.

MacDermid Inc.
526 Huntingdon Ave.
Waterbury 20, Conn.

Magnus Chemical Co., Inc.
69 South Ave.
Garwood, N. J.

Northwest Chemical Co.
9310 Roselawn Ave.
Detroit 4, Mich.

Oakite Products, Inc.
50A Rector St.
New York 6, N. Y.

Parker Rust Proof Co.
2177 E. Milwaukee Ave.
Detroit 11, Mich.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

Wyandotte Chemicals Corp.
J. B. Ford Div'n
Wyandotte, Mich.

COATINGS, ELECTRICALLY CONDUCTIVE

Allied Research Products, Inc.
4004 E. Monument St.
Baltimore 5, Md.

Amchem Products, Inc.
Ambler 12, Pa.

Grafo Colloids Corp.
Sharon, Pa.

Graphite Products Corp.
Brookfield, Ohio

MacDermid Inc.
526 Huntingdon Ave.
Waterbury 20, Conn.

COIL, ALUMINUM

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

Aluminum Mills, Inc.
1660 Deerfield Rd.
Highland Park, Ill.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Chase Brass & Copper Co.
Waterbury 20, Conn.

Consolidated Aluminum Corp.
Jackson, Tenn.

Consolidated General Products, Inc.
Box 7425
Houston 8, Texas

The Dow Metal Products Co.
Div'n of The Dow Chemical Co.
Midland, Mich.

Fairmont Aluminum Company
Fairmont, West Virginia

Hunter Engineering Co.
1495 Columbia Ave.
Riverside, Calif.

International Selling Corp.
220 E. 42nd St.
New York 17, N. Y.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

LaPointe Industries Inc.
Rockville, Conn.

Nichols Wire & Aluminum Co.
Davenport, Iowa

Olin Aluminum
400 Park Avenue
New York 22, N. Y.

Pfister Aluminum Corp.
50 West Allendale Ave.
Allendale, N. J.

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pa.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Scovill Manufacturing Co.
99 Mill Street
Waterbury, Connecticut

Wolverine Tube Div'n
Calumet & Hecla, Inc.
Dept. N, 17262 Southfield Road
Allen Park, Mich.

COILS, PRE-ANODIZED

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

Coil Anodizers, Inc.
1250 Keating Ave.
Muskegon, Mich.

Fairmont Aluminum Co
Fairmont, West Virginia

International Selling Corp.
220 E. 42nd St.
New York 17, N. Y.

Olin Aluminum
400 Park Ave.
New York 22, N. Y

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pa.

Rusmar Processing Co.
212 Northwest Highway
Fox River Grove, Ill.

COLD HEADING WIRE, ALUMINUM

Alabama Wire Co., Inc.
Florence, Ala.

Nichols Wire & Aluminum Co.
Davenport, Ia.

COMPOUNDS, BARREL FINISHING

Allied Research Products, Inc
4004 East Monument St.
Baltimore 5, Md.

Heatbath Corp.
Springfield 1, Mass.

MacDermid Inc.
526 Huntingdon Ave.
Waterbury 20, Conn.

Magnus Chemical Co., Inc.
69 South Ave.
Garwood, N. J.

Oakite Products, Inc.
50A Rector St.
New York 6, New York

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

Wyandotte Chemicals Corp.
J. B. Ford Div'n
Wyandotte, Mich.

CONVERSION COATING, ALUMINUM

Allied Research Products, Inc.
4004 E. Monument St.
Baltimore 5, Md.

Amchem Products, Inc.
Ambler 12, Pa.

Conversion Chemical Corp.
99 E. Main St.
Rockville, Conn.

Diversey Corp.
212 W. Monroe St.
Chicago 6, Ill.

Frederick Gumm Chemical Co., Inc.
538 Forest St.
Kearny, N. J.

Heatbath Corp.
Springfield 1, Mass.

MacDermid Inc.
526 Huntingdon Ave.
Waterbury 20, Conn.

Northwest Chemical Co.
9310 Roselawn Ave.
Detroit 4, Mich.

Oakite Products, Inc.
50-A Rector St.
New York 6, N. Y.

Parker Rust Proof Co.
2177 E. Milwaukee Ave.
Detroit 11, Mich.

Pennsalt Chemicals Corp.
Philadelphia 2, Pa.

Wyandotte Chemicals Corp.
J. B. Ford Div'n
Wyandotte, Mich.

CUTTING, GRINDING COMPOUNDS

Kerns United Corp.
2659 E. 95th St.
Chicago 17, Ill.

Magnus Chemical Co., Inc.
69 South Ave.
Garwood, N. J.

Oakite Products, Inc.
50-A Rector St.
New York 6, N. Y.

Park Chemical Co.
8074 Military Ave.
Detroit 4, Mich.

DIE STEELS FOR DIE CASTING

Ajax Steel & Forge Co.
205 Adair St.
Detroit 7, Mich.

Latrobe Steel Co.
Latrobe, Pa.

U.N. Alloy Steel Co.
365 Dorchester Ave.
Boston 27, Mass.

DIE STEEL, EXTRUSION

Ajax Steel & Forge Co.
205 Adair St.
Detroit 7, Mich.

Latrobe Steel Co.
Latrobe, Pa.

Marathon Specialty Steels, Inc.
375 Park Ave.
New York 22, N. Y.

U.N. Alloy Steel Co.
365 Dorchester Ave.
Boston 27, Mass.

DRAWING COMPOUNDS, METAL

Grafo Colloids Corp.
Sharon, Pa.

Graphite Products Corp.
Brookfield, Ohio

Kerns United Corp.
2659 E. 95th St.
Chicago 17, Ill.

Magnus Chemical Co., Inc.
69 South Ave.
Garwood, N. J.

Northwest Chemical Co.
9310 Roselawn Ave.
Detroit 4, Mich.

Oakite Products, Inc.
50-A Rector St.
New York 6, N. Y.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

DYES, ANODIZING

Koppers, Inc.
Chemicals & Dyestuffs Div.
Porter Building
Pittsburgh 19, Pa.

ENAMELS, PORCELAIN ALUMINUM

Ferro Corporation
4150 E. 56th St.
Cleveland 5, Ohio

ETCHANT, ALUMINUM

Allied Research Products, Inc.
4004 East Monument St.
Baltimore 5, Md.

Amchem Products, Inc.
Ambler 12, Pa.

The Diversey Corp.
212 W. Monroe St.
Chicago 6, Ill.

Frederick Gumm Chemical Co.
538 Forest St.
Kearny, N. J.

Heatbath Corp.
Springfield 1, Mass.

Magnus Chemical Co., Inc.
69 South Ave.
Garwood, N. J.

Northwest Chemical Co.
9310 Roselawn Ave.
Detroit 4, Mich.

Oakite Products, Inc.
50A Rector St.
New York 6, N. Y.

Parker Rust Proof Co.
2177 E. Milwaukee Ave.
Detroit 11, Mich.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

Wyandotte Chemicals Corp.
J. B. Ford Div'n
Wyandotte, Mich.

EXTRUSIONS, ALUMINUM

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Mich.

General Extrusions, Inc.
4040 Lake Park Road
Youngstown, Ohio

Harvey Aluminum
Torrance, Calif.

Jarl Extrusions, Inc.
Linden Road
East Rochester, N. Y.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Olin Aluminum
400 Park Avenue
New York 22, New York

Pfister Aluminum Corp.
50 West Allendale Ave.
Allendale, N. J.

Precision Extrusions, Inc.
720 E. Green St.
Bensenville, Ill.

Quaker State Metals Co.
Extrusion Div'n
Standiford Ave.
Louisville 1, Ky.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Southern Extrusions Co.
North Washington Street
Magnolia, Arkansas

Superior Industries, Inc.
3786 Oakwood Ave.
Youngstown, Ohio

Wolverine Tube Div.
Calumet & Hecla, Inc.
17262 Southfield Rd.
Allen Park, Mich.

EXTRUSIONS, IMPACT

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa. (Al)

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Connecticut

Brooks & Perkins Inc.
1950 W. Fort St.
Detroit 16, Mich.

Harvey Aluminum
Torrance, Calif.

Scovill Mfg. Co.
99 Mill St.
Waterbury, Conn.

EXTRUSIONS, IMPACT, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

EXTRUSIONS, MAGNESIUM

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Michigan

EXTRUSIONS, TITANIUM

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Connecticut

Harvey Aluminum
Torrance, Calif.

EXTRUSIONS, ZIRCONIUM

Harvey Aluminum
Torrance, Calif.

FASTENERS, ALUMINUM

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

Groov-Pin Corp.
1123 Hendricks Causeway
Ridgefield, N. J.

New England Nut Mfg. Co., Inc.
17 Viking Terrace
Worcester, Mass.

Southern Screw Company
Statesville, North Carolina

FENCING, ALUMINUM

Nichols Wire & Aluminum Co.
Davenport, Iowa

FINISHES AND COATINGS, ALUMINUM

Allied Research Products, Inc.
4004 East Monument St.
Baltimore 5, Md.

Amchem Products, Inc.
Ambler 12, Pennsylvania

Conversion Chemical Corp.
99 E. Main St.
Rockville, Conn.

De Soto Chemical Coatings, Inc.
1350 S. Kostner Ave.
Chicago 23, Ill.

Diversey Corp.
212 W. Monroe St.
Chicago 6, Ill.

Frederick Gumm Chemical Co.
538 Forest St.
Kearny, N. J.

Heatbath Corp.
Springfield 1, Mass.

Macco Products Co.
9220 S. Sangamon St.
Chicago 20, Ill.

MacDermid Inc.
526 Huntingdon Ave.
Waterbury 20, Conn.

Magnus Chemical Co., Inc.
69 South Ave.
Garwood, N. J.

Northwest Chemical Co.
9310 Roselawn Ave.
Detroit 4, Mich.

Oakite Products, Inc.
50A Rector St.
New York 6, New York

Parker Rust Proof Co.
2177 E. Milwaukee Ave.
Detroit 11, Mich.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

Virginia-Carolina Chemical Corp.
401 E. Main St.
Richmond 8, Va.

FLUXES, MELTING

Alloys & Chemicals Corp.
4365 Bradley Road, S. W.
Cleveland 9, Ohio

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

Aluminum & Magnesium, Inc.
Sandusky, Ohio

Apex Smelting Company
2537 West Taylor Street
Chicago 12, Illinois

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Park Chemical Co.
8074 Military Ave.
Detroit 4, Mich.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

FLUX, SOLDERING, BRAZING, WELDING

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

FOIL, ALUMINUM

Aluminum Co. of America
1277 Alcoa Building
Pittsburgh 19, Pa.

Anaconda Aluminum Co.
P.O. Box 1654
Louisville 1, Ky.

Consolidated Aluminum Corp.
Jackson, Tenn.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Reynolds Metals Company
6601 West Broad St.
Richmond 18, Va.

FOIL, ALUMINUM, ANODIZED

Coil Anodizers, Inc.
1250 Keating Ave.
Muskegon, Mich.

FORGING COMPOUNDS

Kerns United Corp.
2659 E. 95th St.
Chicago 17, Ill.

FORGINGS, ALUMINUM

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Conn. (Al, Ti)

Chase Brass & Copper Co.
Waterbury 20, Conn.

Harvey Aluminum
Torrance, Calif.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Scovill Manufacturing Co.
99 Mill St.
Waterbury, Conn.

FORGINGS, EXTRUSION, TOOL

Ajax Steel & Forge Co.
205 Adair St.
Detroit 7, Mich.

Latrobe Steel Co.
Latrobe, Pa.

FORGINGS, IMPACT

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Harvey Aluminum
Torrance, Calif.

Scovill Mfg. Co.
99 Mill St.
Waterbury, Conn.

FORGINGS, MAGNESIUM

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Harvey Aluminum
Torrance, Calif.

FRIT, PORCELAIN ENAMEL

Ferro Corp.
4150 E. 56th St.
Cleveland 5, Ohio

GALLIUM

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

A.I.A.G. Metals, Inc.
9 Rockefeller Plaza
New York 20, N. Y.

International Selling Corp.
220 E. 42nd St.
New York 17, N. Y.

HARDWARE, DOOR, WINDOW

Cipco Corporation
22nd & Cole Street
St. Louis 6, Mo.

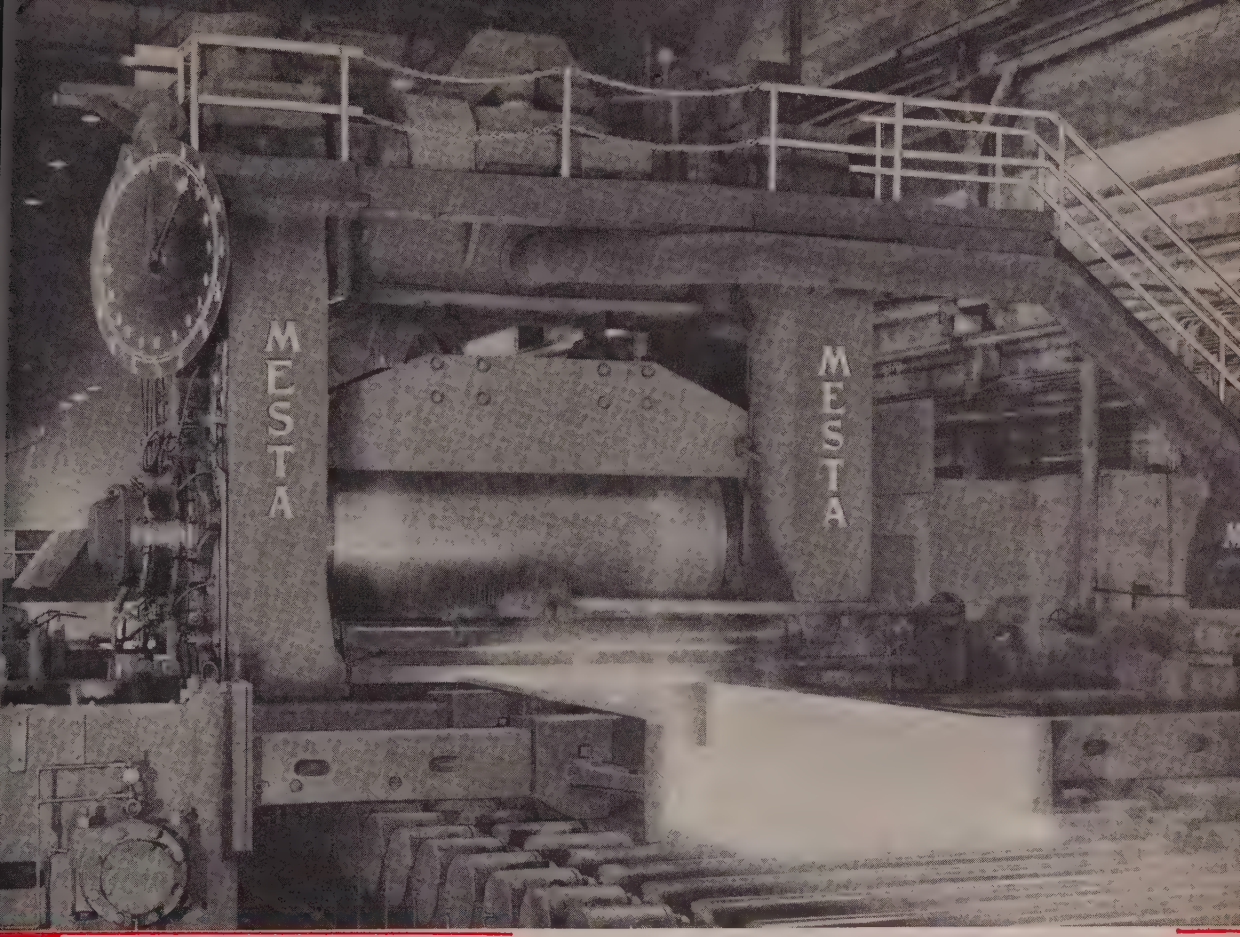
HEAT TREATING SALTS, ALUMINUM

Heatbath Corp.
Springfield 1, Mass.

Park Chemical Co.
8074 Military Ave.
Detroit 4, Mich.

HIGH PURITY ALUMINUM

International Selling Corp.
220 E. 42nd St.
New York 17, N. Y.

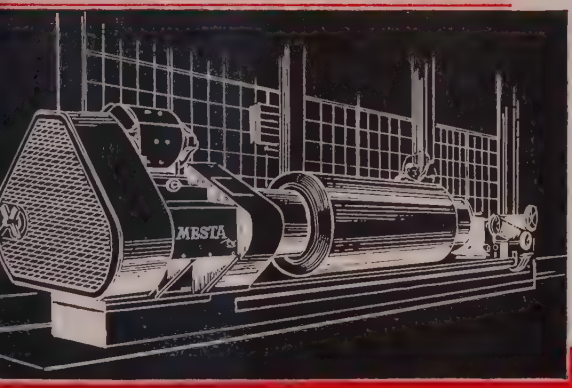


MESTA 148" Four-High Reversing Plate Mill
at Fontana Works of Kaiser Steel Corporation.

PLATE MILLS

designed and built by

MESTA



Designers and Builders of Complete Steel Plants

MESTA MACHINE COMPANY

PITTSBURGH, PENNSYLVANIA

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

Consolidated Aluminum Corp.
Jackson, Tenn.

Kaiser Aluminum & Chemical Corp.
Kaiser Center
Oakland 12, Calif.

HIGH PURITY MAGNESIUM

Dominion Magnesium Ltd.
320 Bay St.
Toronto, Ont.

INGOT, ALUMINUM (ALLOYS)

Alloys & Chemicals Corp.
4365 Bradley Road, S. W.
Cleveland 9, Ohio

Aluminium Limited Sales, Inc.
630 Fifth Avenue
New York 20, New York

Aluminum & Magnesium, Inc.
Sandusky, Ohio

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

Apex Smelting Company
2537 West Taylor Street
Chicago 12, Illinois

Harvey Aluminum
Torrance, Calif.

International Selling Corp.
220 E. 42nd St.
New York 17, N. Y.

William F. Jobbins, Inc.
P. O. Box 230
Aurora, Ill.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Olin Aluminum
400 Park Ave.
New York 22, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

INGOT, MAGNESIUM (ALLOYS)

Apex Smelting Company
2537 West Taylor Street
Chicago 12, Illinois

Dominion Magnesium Limited
320 Bay St.
Toronto, Ont.

The Dow Chemical Co.
Metals Dept.
Midland, Mich.

International Selling Corp.
220 E. 42nd St.
New York 17, N. Y.

IRRIGATION PIPE, ALUMINUM

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

General Extrusions, Inc.
4040 Lake Park Road
Youngstown, Ohio

Harvey Aluminum
Torrance, Calif.

Hunter Engineering Co.
1495 Columbia Ave.
Riverside, Calif.

Jarl Extrusions, Inc.
Linden Road
East Rochester, N. Y.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Olin Aluminum
400 Park Ave.
New York 22, N. Y.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

LUBRICANTS: EXTRUDING, CASTING, FORMING

Acheson Colloids Co.
Div. Acheson Industries, Inc.
Port Huron, Mich.

Fiske Brothers Refining Co.
129K Lockwood St.
Newark 5, N. J.

Grafo Colloids Corp.
259 Wilkes Place
Sharon, Pa.

Graphite Products Corp.
Brookfield, Ohio

Kerns United Corp.
2659 E. 95th St.
Chicago, Ill.

Macco Products Co.
9220 S. Sangamon St.
Chicago 20, Ill.

MacDermid Inc.
526 Huntingdon Ave.
Waterbury 20, Conn.

Magnus Chemical Co., Inc.
69 South Ave.
Garwood, N. J.

Northwest Chemical Co.
9310 Roselawn Ave.
Detroit 4, Mich.

Oakite Products, Inc.
50A Rector St.
New York 6, New York

Parker Rust Proof Co.
2177 E. Milwaukee Ave.
Detroit 11, Mich.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

MAINTENANCE MATERIALS, PAINT SPRAY BOOTH

The Diversey Corp.
212 W. Monroe St.
Chicago 6, Ill.

Kerns United Corp.
2659 E. 95th St.
Chicago 17, Ill.

MacDermid Inc.
526 Huntingdon Ave.
Waterbury 20, Conn.

Northwest Chemical Co.
9310 Roselawn Ave.
Detroit 4, Mich.

Oakite Products, Inc.
50A Rector St.
New York 6, N. Y.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

Wyandotte Chemicals Corp.
J. B. Ford Div'n
Wyandotte, Mich.

NAILS, ALUMINUM

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

Nichols Wire & Aluminum Co.
Davenport, Iowa

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pa.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

NUTS

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

PANELS, ANODIZED

Scovill Mfg. Co.
99 Mill St.
Waterbury, Conn.

PIPE, ALUMINUM

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

The Dow Metal Products Co.
Div'n Dow Chemical Co.
Midland, Mich.

General Extrusions, Inc.
4040 Lake Park Road
Youngstown, Ohio

Harvey Aluminum
Torrance, Calif.

Hunter Engineering Co.
1495 Columbia Ave.
Riverside, Calif.

Jarl Extrusions, Inc.
Linden Road
East Rochester, N. Y.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Olin Aluminum
400 Park Ave.
New York 22, N. Y.

Quaker State Metals Co.
Manheim Pike at 230 Bypass
Lancaster, Pa.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

C. A. Roberts Co.
2401 25th Ave.
Franklin Park, Ill.

Wolverine Tube Div.
Calumet & Hecla, Inc.
17262 Southfield Rd.
Allen Park, Mich.

PIPE FITTINGS

C. A. Roberts Co.
2401 25th Ave.
Franklin Park, Ill.

PLASTIC CAPS, INSERTS

Impex Corp.
4049 Simon Road
Youngstown 12, Ohio

PLASTIC, RESIN

Union Carbide Plastics Co.
Div'n of Union Carbide Corp.
270 Park Ave.
New York 17, N. Y.

PLATE, ALUMINUM

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

Anaconda Aluminum Co.
P. O. Box 1654
Louisville 1, Ky.

The Dow Metal Products Co.
Div'n, The Dow Chemical Co.
Midland, Mich.

Fairmont Aluminum Company
Fairmont, West Virginia

International Selling Corp.
220 E. 42nd St.
New York 17, N. Y.

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Nichols Wire & Aluminum Co.
Rockingham Road
Davenport, Iowa

Olin Aluminum
400 Park Avenue
New York 22, New York

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

PLATE, MAGNESIUM

Brooks & Perkins, Inc.
1950 W. Fort St.
Detroit 16, Mich.

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Michigan

POLISHING, BUFFING COMPOUNDS

Frederick Gumm Chemical Co., Inc.
538 Forest St.
Kearny, N. J.

POLISHING, CHEMICAL

Alchemize Corporation
621 South Kolmar
Chicago 24, Illinois

Allied Research Products, Inc.
4004 East Monument St.
Baltimore 5, Md.

Conversion Chemical Corp.
99 E. Main St.
Rockville, Conn.

Frederick Gumm Chemical Co., Inc.
538 Forest St.
Kearny, N. J.

Heatbath Corp.
Springfield 1, Mass.

MacDermid Inc.
526 Huntingdon Ave.
Waterbury 20, Conn.

Virginia-Carolina Chemical Corp.
431 E. Main St.
Richmond 8, Va.

PRE-PAINTED SHEET & COIL

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

Bridgeport Brass Co.
30 Grand St.
Bridgeport 2, Conn.

Consolidated General Products, Inc.
P. O Box 7425
Houston 8, Tex.

Enameled Steel & Sign Co.
4658 W. Addison St.
Chicago 41, Ill.

Fairmont Aluminum Co.
Fairmont, West Virginia

Hunter Engineering Co.
1495 Columbia Ave.
Riverside, Calif.

Olin Aluminum
400 Park Ave.
New York 22, N. Y.

Pre Finish Metals Inc.
2110 E. Pratt Blvd.
Elk Grove, Ill.

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

Seaway Products
Div'n Globe Industries Inc.
2207 Schrage Ave.
Whiting, Ind.

Zegers, Inc.
8090 So. Chicago Ave.
Chicago 17, Ill.

REFRACTORY PRODUCTS

Harbison-Walker Refractories Co.
Farmers Bank Building
Pittsburgh 22, Pa.

Kaiser Refractories
Kaiser Center
Oakland 12, Calif.

Plibrico Co.
1800 N. Kingsbury St.
Chicago 14, Ill.

Refractory Products Co.
910 Custer Ave.
Evanston, Ill.

RIVETS, ALUMINUM

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

ROD, BRAZING

Alabama Wire Co., Inc.
P. O. Box 648
Florence, Alabama

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

Nichols Wire & Aluminum Co.
Davenport, Iowa

ROD, WELDING

Alabama Wire Co., Inc.
P. O. Box 648
Florence, Alabama

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

The Dow Metal Products Co.
Div'n, Dow Chemical Co.
Midland, Mich.

Fairmont Aluminum Co.
Fairmont, West Virginia

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

Nichols Wire & Aluminum Co.
Davenport, Iowa

Reynolds Metals Company
6601 W. Broad St.
Richmond 18, Va.

ROLL FORMED SHAPES

Allmetal Weatherstrip Co.
1911 Ridge Ave.
Evanston, Ill.

ROLLING OILS

Kerns United Corp.
2659 E. 95th St.
Chicago 17, Ill.

SCREEN WIRE, ALUMINUM

Alabama Wire Co., Inc.
P. O. Box 648
Florence, Alabama

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

Fairmont Aluminum Co.
Fairmont, West Virginia

Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

SCREWS, MACHINE, ALUMINUM

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1227 Alcoa Building
Pittsburgh 19, Pa.

Southern Screw Company
Statesville, North Carolina

SCREWS, TAPPING, ALUMINUM

Southern Screw Company
Statesville, North Carolina

SCREWS, WOOD, ALUMINUM

Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

Southern Screw Company
Statesville, North Carolina

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Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

Nichols Wire & Aluminum Co.
Davenport, Iowa

r State Metals Co.
heim Pike at 230 Bypass
caster, Pennsylvania
Aluminum Corp.
Vest Allendale Ave.
ndale, N. J.
lds Metals Company
W. Broad St.
mond 18, Va.

', ALUMINUM

num Co. of America
7 Alcoa Building
sburgh 19, Pa.
num Mills, Inc.
) Deerfield Road
hland Park, Ill.
nda Aluminum Co.
O. Box 1654
isville 1, Ky.
eport Brass Company
Grand St.
geport 2, Conn.
idated Aluminum Corp.
kson, Tenn.
idated General Products, Inc.
. 7425
uston 8, Texas
Dow Metal Products Co.
'n, The Dow Chemical Co.
lland, Mich.
ont Aluminum Company
rmont, West Virginia
er Engineering Co.
5 Columbia Ave.
erside, Calif.
national Selling Corp.
E. 42nd St.
w York 17, N. Y.
r Aluminum & Chemical Sales
ser Center
kland 12, Calif.
ols Wire & Aluminum Co.
venport, Iowa
Aluminum
) Park Avenue
w York 22, New York
er State Metals Co.
nheim Pike at 230 Bypass
ncaster, Pa.
olds Metals Company
01 W. Broad St.
hmond 18, Va.
ll Manufacturing Co.
Mill Street
aterbury, Conn.

T, ANODIZED

inum Co. of America
27 Alcoa Building
tsburgh 19, Pa.
Plating & Polishing Co.
nd & Cole Street
Louis 6, Missouri
Anodizers, Inc.
50 Keating Ave.
uskegon, Mich.
mont Aluminum Co.
irmont, West Virginia
ker State Metals Co.
anheim Pike at 230 Bypass
ncaster, Pennsylvania
olds Metals Company
01 W. Broad St.
chmond 18, Va.
hern Extrusions, Inc.
orth Washington Street
agnolia, Arkansas

ET, MAGNESIUM

ks & Perkins, Inc.
50 W. Fort St.
troit 16, Mich.
Dow Metal Products Co.
v'n, Dow Chemical Co.
idland, Mich.

DER, ALUMINUM

minum Co. of America
27 Alcoa Building
ttsburgh 19, Pa.
duction Metals, Inc.
99 Pavonia Ave.
rsey City 2, N. J.

IPPERS, METAL & PAINT

ed Research Products, Inc.
004 East Monument St.
altimore 5, Md.
Diversey Corp.
12 W. Monroe St.
hicago 6, Ill.
derick Gumm Chemical Co., Inc.
38 Forest St.
earny, N. J.

Heatbath Corp.
Springfield 1, Mass.

Kerns United Corp.
2659 E. 95th St.
Chicago 17, Ill.

MacDermid Inc.
526 Huntingdon Ave.
Waterbury 20, Conn.

Magnus Chemical Co., Inc.
69 South Ave.
Garwood, N. J.

Northwest Chemical Co.
9310 Roselawn Ave.
Detroit 4, Mich.

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50A Rector St.
New York 6, N. Y.

Pennsalt Chemicals Corp.
Three Penn Center
Philadelphia 2, Pa.

Wyandotte Chemicals Corp.
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Toronto, Ont.

International Selling Corp.
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New York 17, N. Y.

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Reynolds Metals Co.
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Richmond 18, Va.

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The Dow Metal Products Co.
Div'n, The Dow Chemical Co.
Midland, Mich.

TREAD PLATE, MAGNESIUM

The Dow Metal Products Co.
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Pittsburgh 19, Pa.

Olin Roll-Bond Division
East Alton, Ill.

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Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

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Div'n, Dow Chemical Co.
Midland, Mich.

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Torrance, Calif.

Hunter Engineering Co.
1495 Columbia Ave.
Riverside, Calif.

Jarl Extrusions, Inc.
Linden Road
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Kaiser Aluminum & Chemical Sales
Kaiser Center
Oakland 12, Calif.

LaPointe Industries Inc.
Rockville, Conn.

Olin Aluminum
400 Park Avenue
New York 22, New York

Pfister Aluminum Corp.
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Allendale, N. J.

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Richmond 18, Va.

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Bridgeport 2, Conn.

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Aluminum Co. of America
1227 Alcoa Building
Pittsburgh 19, Pa.

Bridgeport Brass Company
30 Grand St.
Bridgeport 2, Conn.

Fairmont Aluminum Co.
Fairmont, West Virginia

Nichols Wire & Aluminum Co.
Davenport, Iowa

Olin Aluminum
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Grand Rapids 8, Mich.

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Div. Basic Products Corp.
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Milwaukee, Wis.

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Cleveland 15, Ohio

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Chicago 12, Ill.

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Morrison Engineering Corp.
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New York 16, N. Y.

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Chicago 41, Ill.

Florida Industries, Inc.
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Mountainside, N. J.

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New York 16, N. Y.

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Detroit 28, Mich.

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Grand Rapids 2, Michigan

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The Yoder Company
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Cleveland 2, Ohio

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Pittsburgh 22, Pa.

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New York 16, N. Y.

Sutton Engineering Co.
First National Bank Bldg.
Pittsburgh 22, Pa.

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Farrel-Birmingham Co., Inc.
565 Blossom Road
Rochester 10, N. Y.

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Holland, Mich.

Kux Machine Co.
6725 N. Ridge Ave.
Chicago 26, Ill.

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Cleveland 16, Ohio

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Div. Basic Products Corp.
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Milwaukee, Wis.

The Lanly Co.
2800 Euclid Ave.
Cleveland 15, Ohio

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Chicago 12, Ill.

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2060 Eliot St.
Fairfield, Conn.

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Hazel Park, Mich.

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9511 Grinnell Avenue
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DIES, NOTCHING

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Cleveland 16, Ohio

Lindberg Engineering Co.
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Chicago 12, Ill.

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Chicago, Ill.

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Lee-Wilson Engineering Co.
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Cleveland 16, Ohio

Lindberg Engineering Co.
2446 W. Hubbard
Chicago, Illinois

Morrison Engineering Corp.
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Fairfield, Conn.

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Meadville, Pa.

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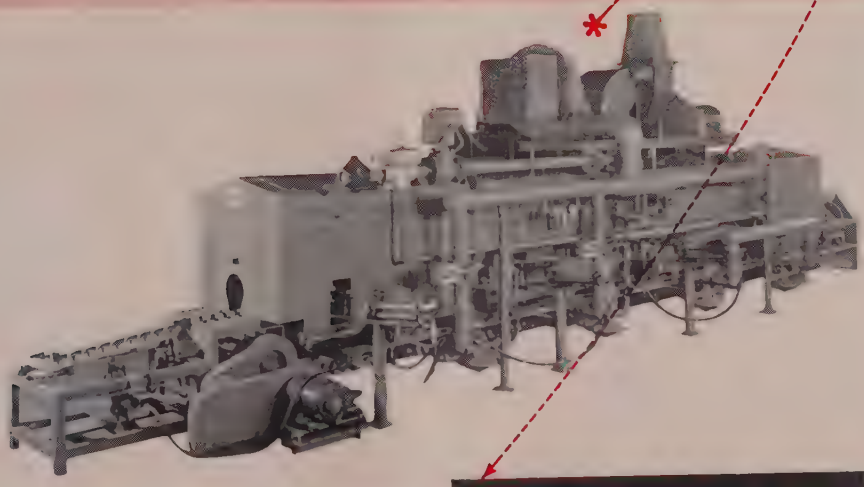

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Denver 18, Colo.

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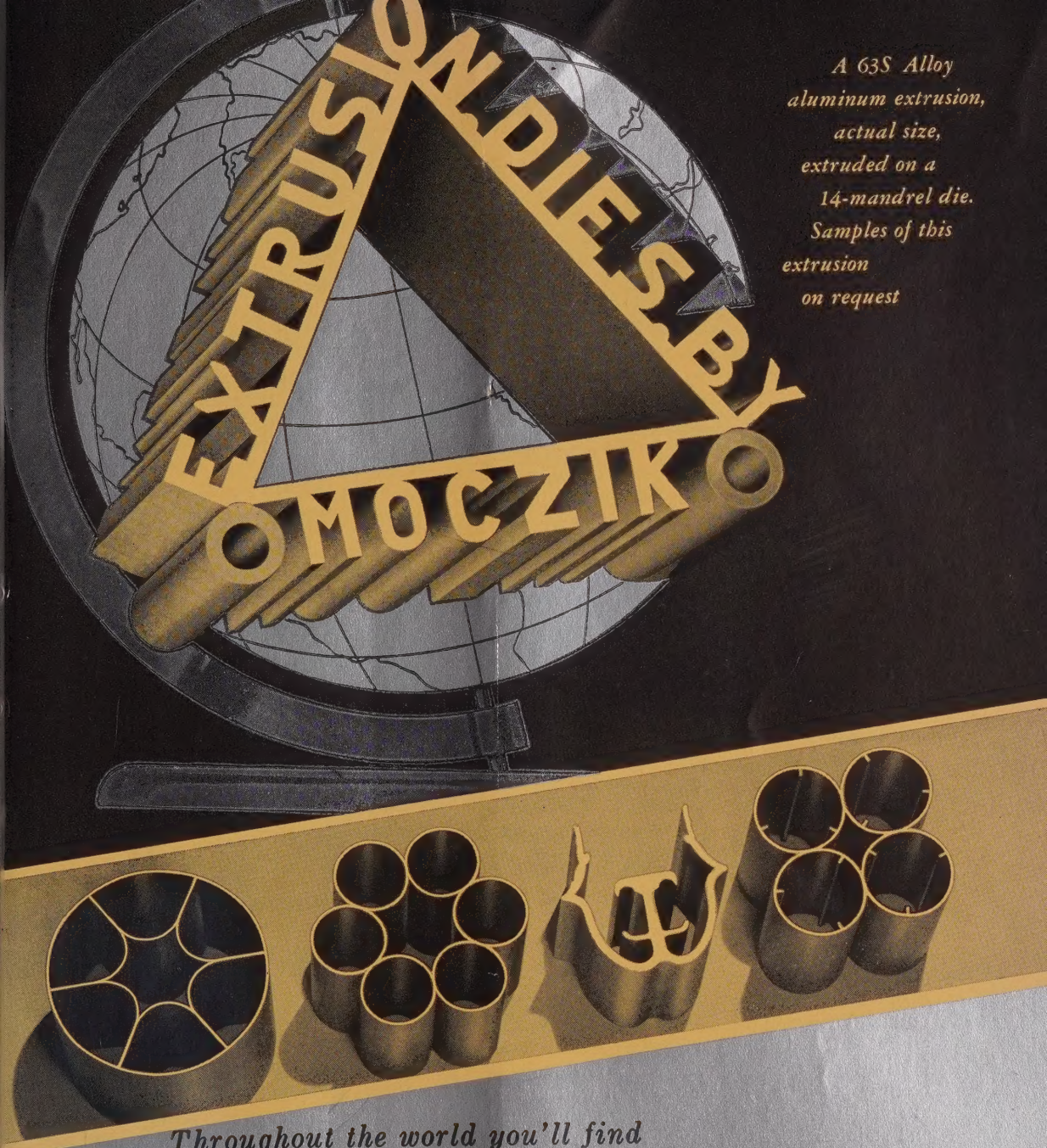

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Looking Ahead

In June, the economy reached year-ago levels for the first time this year. Encouraging, but no sure sign that the recession is over – or that business won't level off this summer. One healthy sign: Spending on new construction – mostly private – is expected to hit a 2-year high in June. If it holds at a rate of about $56 billion throughout the year, it would be a much-needed shot in the arm for the economy as a whole later this year and early 1962.

Upturn in aluminum casting sales has dispelled some of the gloom among foundries and die casters – particularly in the midwest. One Chicago area die caster reported a sharp increase in orders for dies early in June. He thinks it signals optimism over appliance and auto sales this fall and winter; has scheduled a 6-day work week all summer.

Die casters account for most of the optimism uncovered by Modern Metals recent spot survey of the aluminum casting business (see page 30), but several sand and permanent mold foundries also turned in favorable predictions. Adding up tonnages reported, we came up with an indicated 14% rise in casting shipments for '61. Sounds too high for the industry as a whole, but at least indicates probable uptick in casting business generally. A 5% increase would put castings shipments a shade over the 392,500 tons shipped in 1959, but still under the record 409,500 tons shipped in '55.

Curtain wall business has boiled down to a battle between aluminum producers and stainless steel outfits. The resulting stiff price competition has all but squeezed many independent architectural fabricators out of the business. (A few of them recently got hurt by taking curtain wall orders at suicidal prices.) Contest between aluminum and stainless is getting rougher. Stainless boys are trying to grab the initiative; claim architects can specify steel panels half as thick as aluminum, thus making the ferrous stuff nearly competitive in price. Aluminum producers, in an effort to keep a step ahead, have entered into big building projects with real estate developers (the Alcoa-Webb & Knapp projects in Los Angeles and New York are examples). Result: Aluminum gets the nod in huge developments – which will also serve as examples of how to use aluminum in future urban renewal projects. Question: How long will it take the stainless steel crowd to mimic this gimmick?

Price cutting is still a way of life in some segments of the aluminum industry – particularly the extrusion business. It got so bad last month that Anaconda Aluminum shut down its extrusion press at Terre Haute, Ind. This represented less than 10% of Anaconda's output at its new plant, but the company makes its own primary metal, the going must have been really rough.

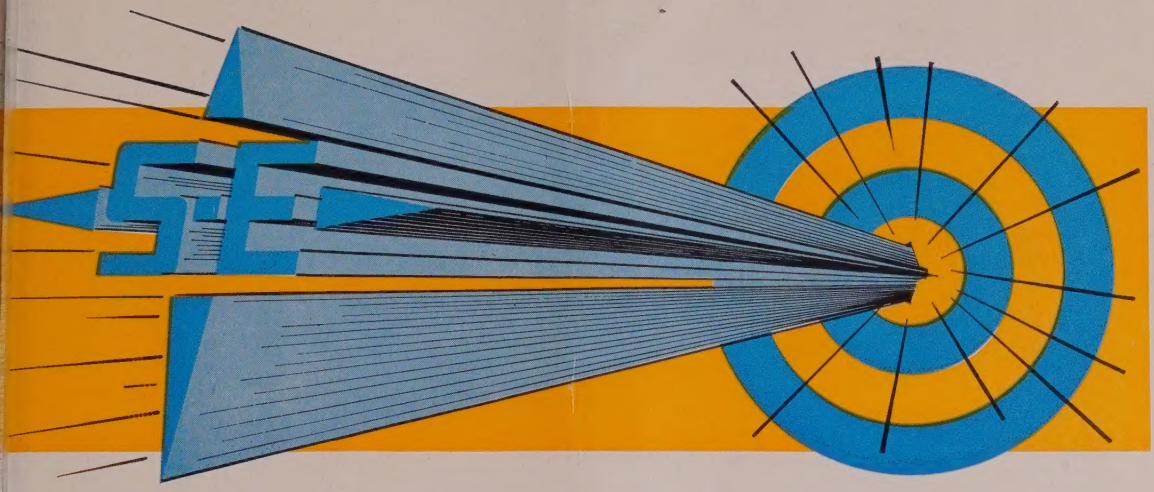
One extrusion billet supplier is selling thousands of tons of billets to extruders at the market price and buying big tonnages of extruded shapes for resale. It raises interesting questions: Is the producer really that anxious to merely move metal? Is the profit spread between raw metal and billet great enough to justify the purchase of shapes for resale? Can the independent extruder make and sell his product at a price the producer cannot match? Other questions come to mind, but these are bad enough.

Then there's the extruder on the west coast who has been paying 60% per year to borrow money from a finance company. After examining the terms of the loan, the extruder took the case to court. He charged that the terms were usurious – which certainly qualifies as the understatement of the month.

Heavy aluminum cable users – particularly some public utilities in the south – are getting cable at bargain basement prices these days. Stuff that normally markets for 30 to 33 cents a pound, which beats the hell out of copper or any other material – is currently selling for 26.3 to 27 cents. No freight charges, either. One 22 million pound order recently went at 26.28 cents a pound – just a fraction of a cent above the price of primary ingot. The Justice Department will have to look hard to find price fixing in the aluminum cable business.

Aluminum farm gates are durable, rustproof, good looking, never need painting, keep hogs in and horses out, etc., etc. So say the ads. But they don't say that a good aluminum gate will cost you back twice as much as a good wood or galvanized steel gate. In the 14-foot size most galvanized jobs cost about $24, while a wood gate brings $27. But for a good aluminum gate you shell out $60 – and it won't be as rugged as claimed. In one wholesaler's yard, a strong wind bent two aluminum gates, while steel and wood jobs came through unscathed. Weighing in at about 40 pounds, the aluminum gate is selling for $1.50 a pound. That's a sizable markup. The dealer interviewed sells 20 wood and steel gates for every aluminum gate he peddles. I wonder.

—The Editor



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